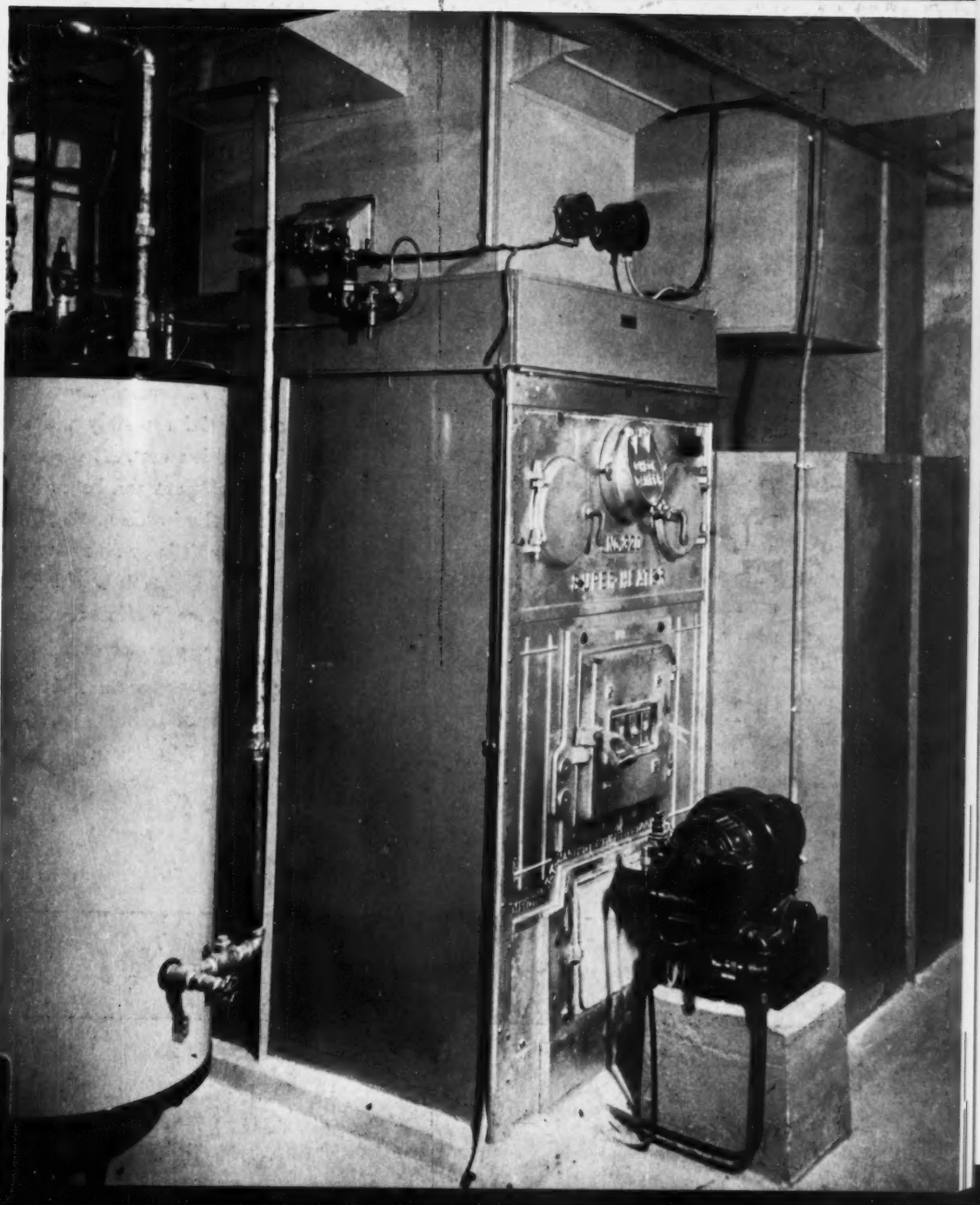
AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING
/ARM AIR HEATING • SHEET METAL CONTRACTING



SEPTEMBER
1939

TABLISHED
8 8 0

LAMNECK SERIES 700 SYSTEM
PREFABRICATED DUCT AND FITTINGS

A NEW TYPE CONNECTION
FOR DUCT AND STACK—

An Advanced Idea Unparalleled in the Industry

Simplifies and Speeds Up Duct and Stack Assembly ...Reduces Air Resistance

● The amazing ease and speed with which Series 700 System is assembled is due in large measure to a marvelous new type Duct and Stack Connection originated by Lamneck.

This exclusive new Lamneck feature is a separate unit into which the unformed ends of the Duct and Stack can be slipped easily without the aid of tools. The Connection is made with a *positive automatic lock* which holds the Duct and Stack securely in place. Notching of Duct, Stack or Fittings is eliminated, thus providing a tight, rigid joint, free from leakage or rattles. The need of large or small ends of duct at the joint is also avoided.

The new Lamneck Connection provides a more substantial assembly which sets a new low in installation cost. At the same time it insures a more efficient and better looking job. Finally, it leaves the inside of the Duct perfectly smooth, offering little or no resistance to the flow of air in either direction. This feature is of greatest importance in efficient air distribution.

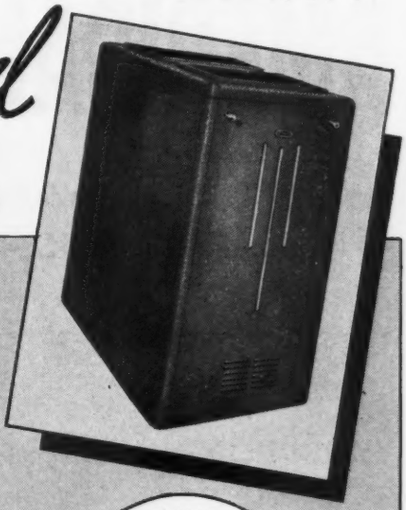
Lamneck Series 700 System has everything it takes to make installation speedy, efficient and economical.

Write for Name of Your Nearest Distributor.

LAMNECK PRODUCTS, INC.
414 DUBLIN AVENUE • COLUMBUS, OHIO

PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF RESIDENTIAL WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

Don't be Mis-led by the PRICE



The reason for Lochinvar's low fuel consumption is Lochinvar's exclusive Multiple Stage Burner (patented) LISTED AS STANDARD BY UNDERWRITERS' LABORATORIES, to burn No. 1 or No. 2 fuel oil. This burner has no moving parts, nothing to wear out or cause any servicing, yet its cleanliness and efficiency are unequalled by the most expensive oil burner made.

• FEATURES •

1. DOUBLE CASING—Covering the constant level control, combustion chamber door and all wiring.
2. COMBUSTION CHAMBER DOOR AND WATER COIL OPENING.
3. FIREBRICK—Which lines the combustion chamber above the burner —adding life to the furnace and efficiency to the burner.
4. LOCHINVAR MULTIPLE-STAGE BURNER—No moving parts, nothing to wear out or replace.
5. DOUBLE RADIATOR OR HEAT ECONOMIZER—Giving extra heating surface, maximum amount of efficiency and reducing the stack temperature to a minimum.
6. FILTERS—Fireproof. Can be easily removed when necessary.
7. BLOWER—Its rubber mounting insures you quiet operation.
8. ACCESS DOOR—To filters, blower and motor.

LOOK AT THESE FEATURES

Just because the Lochinvar units have features that are only found on the more expensive furnaces, don't get the impression that they are high priced. In fact, their prices are the lowest, for they were designed by the Lochinvar engineers to meet the demand for a COMPLETE automatic oil burning and winter air conditioning furnace that would come within the building budget of the moderate priced home builders, yet at the same time have all the big furnace features.

It will be to your advantage to find out about Lochinvar prices now, because here are complete automatic heating units that will open the way to increased sales and profits for you, in that fast growing low price home building market.

LOCHINVAR HAS A COMPLETE LINE OF AUTOMATIC OIL BURNING UNITS

Model illustrated is the Junior-Aire, a complete automatic oil burning and winter air conditioning unit with a 80,000 B.T.U. output at register. The Model 100 A, a complete winter air conditioning unit with a 110,000 B.T.U. output, at register. Lochinvar's new Package-unit, the Challengaire, with a 59,000 B.T.U. output at bonnet, is 24" wide, 43" long, and 54" high, can pass through any door, is shipped completely assembled.

The Model 100 gravity warm air furnace is an ideal unit for replacement.

Lochinvar's Water heater, the largest selling automatic oil burning water heater made, comes in 20, 30, 40 and 50 gallon sizes.

PRICES AND LITERATURE ON REQUEST

Lochinvar

Lochinvar Corporation
14247 Tireman Ave.
Dearborn, Michigan

Gentlemen:

Please send complete information on ( ) Junior-Aire, ( ) Model 100 A, ( ) Model 100, ( ) Challengaire, ( ) Water Heater.

Name_____

Address_____

City_____ State_____

LOCHINVAR CORPORATION, 14247 TIREMAN, DETROIT, MICH.

AMERICAN ARTISAN

WITH WHICH ARE MERGED

FURNACES & SHEET METALS

AND

Warm-Air Heating

Covering All Activities in Residential Air Conditioning and Small Commercial Cooling, Warm Air Heating, Sheet Metal Contracting and Fabricating

J. D. Wilder, Editor — A. A. Kennedy, Assistant Editor

Vol. 108, No. 9 — September, 1939 — Founded 1880

CONTENTS

Our Trust 35
Cincinnati's Largest Furnace Cleaner 36
Installing and Licensing Code of Columbus, Ohio 38
Profits Obtained from a Variety of Sales 40
The Problem Corner 42
Association Activities 77
New Products 78
With the Manufacturers 86
News Items 92
New Literature 94

RESIDENTIAL AIR CONDITIONING SECTION

Frictional Resistance of Air in Straight Ducts 45
Attic Fans in Multi-Story Buildings 52
Three Types of Heat Conservation 54
Air Conditioning a Radiator-Heated Home 56
Stoker in Pipeless Furnace Heats Printing Plant 60

THE SHEET METAL SECTION

Overhead Methods of a Specialty Fabricator 63
Collecting System for Hot Gases and Materials 66
Weight Per Linear Foot of Galvanized Ducts 67
Ledkote Specializes in Leadcoating 68
Metal Covering for an Old Cornice 70
Resistance Welding of Copper Alloys 72

In This Issue

THE picture used on the cover of this issue shows a winter air conditioning system installed in a large Kansas City house by contractor Arthur Hunt. The job is typical of the larger houses, the owners of which want the latest and best air conditioning systems available. Heat is automatic, uniform temperature is demanded, air circulation with cleaning and humidification are expected.

•

Columbus, Ohio, has a new installing and licensing code. Part 1 of the code appears on page 38. Unusually clear provisions are included to cover the home owner who does his own work and to make certain that the holder of a license can be readily identified.

•

Attic fans are finding a multiplicity of uses—not always in attics. Lawrence Gichner, Washington, D. C., tells of his experiences in placing fans in multi-story buildings on page 52. This idea should broaden the field of application.

•

A combination winter and summer air conditioning system is described by its designing engineer on page 56. The job is large—both heating and cooling are complicated and use special equipment—and the operating characteristics are worth study.

•

Alonzo Saucier, whose overhead methods are described on page 63, has spent much effort in developing the method explained. Mr. Saucier believes that for the metal fabricator, this idea of applying overhead on productive labor as a dollars and cents charge, eliminates much trouble. Mr. Saucier will no doubt be glad to explain any details. Write us for the address.

•

The metal cornice explained by A. A. Kellogg on page 70 is, we think, an ingenious solution to a common problem with old cornices.

Member of Audit Bureau of Circulations — Member Associated Business Papers, Inc.

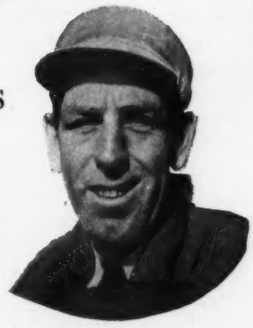
Published monthly by Keeney Publishing Company, 6 North Michigan Ave., Chicago. Branch Offices—In New York, Room 1734, Grand Central Terminal Building, Murray Hill 9-8293; In Cleveland, 2128 Rossmoor Road, Cleveland Heights, Yellowstone 1540; In Los Angeles, J. H. Tinkham, 1406 S. Grand Ave., Richmond 6191. Copyright 1939 by Keeney Publishing Company — F. P. Keeney, President; W. J. Osborn, Vice President; R. Payne Wettstein, Secretary; Chas. E. Price, Treasurer. Advertising staff: Wallace J. Osborn, R. Payne Wettstein, Robert A. Jack, J. H. Tinkham, L. A. Doyle.

Yearly Subscription Price—U. S. and possessions, Canada, Mexico, South America, Central America, $2.00; Foreign, $4.00. Single copies, U. S. and possessions, $.25. Back numbers, $.50. January, 1939, Directory issue, $1.00 per copy. Entered as second-class matter, July 29, 1932, at the post office at Chicago, Illinois, under the act of March 3, 1879.

More than 8,000 copies of this issue are being distributed

HOW BIG IS A PIECE OF GLASS?

BY TIM SHEARS



The other day I'm on my way out to a pretty nifty roofing job to give it the once over. Suddenly going around a corner I nearly bump into a short, funny little guy. He's walking along, kind of careful, with his elbows in at his sides an' his hands stuck straight out in front of him.

"Look out you don't get them hands knocked off," I warns him. "What you holding 'em that way for anyway?" "The boss sent me out for a piece of glass," mumbles the little guy. An' looking at his hands he adds, "This is how big it's got to be!"

Well, there's all sizes of glass jobs. Take the one I'm going out to. It's the glass roof on the New York Metropolitan Museum of Art. Get a job like this every once in a while, an' you don't need to worry about red figures on your books at the end of the year. For this job used a pile of corrugated glass, an' 19,000 lbs. of Monel as well — countin' the sheet roofing... 175,000 lbs. Figure the take on a job like that!

Monel cap flashing was used for sealing the sections of corrugated glass... #24 U. S. Standard was the weight of sheet. Where the roof was standing seam construction #25 U. S. Standard gauge Monel roofing sheet was put on.

An' here's one contractor who takes no chances. "What's the good of putting on a roof that'll wear forever," he says, "an' then go an' fasten it down with stuff that gets eaten away by the weather?" So every stud, hold-down bolt, clip, cleat, nail an' what-have-you on this job is Monel.

Here's a few more tips he gave me. Follow these, an' you'll do a good job for the owner, an' make it easy for yourself:

1. Make bends and seams with a radius at least twice the thickness of sheet.
2. Attach sheet with Monel clips, cleats and nails... and *don't* nail through sheet.
3. Where you have to solder, lock the joints between sheets, and sweat the solder thoroughly into the joints.
4. For soldering Monel sheets, pre-tin edges same as for copper.
5. Monel, as you know, is rigid and resists buckling. So on expansion joints and lock seams follow standard roofing practice... allow for free movement of .186" in a 10-foot length through 200° F. temperature change.

In case you want to figure how much Monel different kinds of roofing jobs take, you'll find the dope in the table below. An' remember: Building owners like Monel for roofs because they know it's strong an' tough an' isn't likely to rust, corrode an' wear out for a good many years to come. That's why you can easily get it in the specs.

Yours for Permanent roofs and Profitable roofing jobs,

TIM SHEARS

• • •

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N. Y.

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

Corrugated glass roof on Metropolitan Museum of Art, New York, N. Y. equipped with Monel sheet, gutters and flashing throughout.

MONEL ROOFING

Approximate Weight per Square (100 sq. ft.)

Type of Roofing	Monel .021" (No. 25 U. S. S.)	Monel .025" (No. 24 U. S. S.)
Flat Seam	120 lb.	150 lb.
Standing Seam	115 lb.	140 lb.
Batten Seam	*125 lb.	*156 lb.
Wt. per Sq. Ft. Monel Sheets	1 lb.	1.16 lb.

*—Varies with size of sheet used and spacing of battens.

Make Permanence *Part of Every Job!*

YOUR customers want their duct work built of a metal that is durable—a metal that will give them added years of service.

You want a material that's easy to work; a material that is instantly recognized and accepted by architects, builders, home owners; a material that builds your reputation for quality work . . . helps you to secure more business.

U·S·S Galvanized Copper Steel Sheets meet all these requirements. You can fabricate this metal into complicated shapes easily and quickly. It's ductile. Every sheet is flat, uniform in gage and size. And extensive tests, supervised by the American Society for Testing Materials over a period of 21 years, proved that Copper Steel lasts more than twice as long when exposed to atmospheric conditions than other comparable materials.

The cost of U·S·S Galvanized Copper Steel is low enough so that you can use it on every job, and thus assure fewer replacements and repairs on ducts, housings, heating systems, roofing, downspouts and flashings . . . wherever metal must meet the combined attacks of air and water.

CUT IT! BEND IT! RIVET IT!

You'll find that U·S·S Galvanized Copper Steel fabricates readily into complicated shapes; helps secure neat joints, true bends, tight seams . . . and saves time on every job.

USS

Look for this symbol on steel products. It's your assurance of the highest quality — the finest metallurgical service.

GALVANIZED COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Scully Steel Products Company, Chicago, *Warehouse Distributors* · United States Steel Products Co., New York, *Export Distributors*

UNITED STATES STEEL

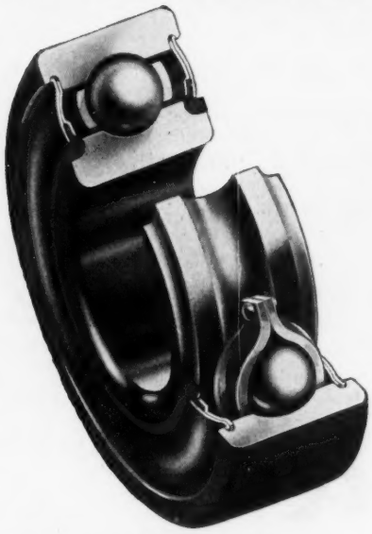
Again

SKF Responds TO INDUSTRY'S NEED!

New—A DOUBLE FELT SEAL BEARING MADE TO STANDARD SINGLE ROW WIDTHS

© 1939, SKF INDUSTRIES, INC.

SKF
RED SEAL BEARINGS



THE STOP SIGNAL FOR DIRT
Patent Applied For

1. Made to standard single row SAE dimensions with races flush on both sides.
2. Assures perfect sealing and retention of grease over great range of speeds.
3. Provides for large area of felt fibre contact, yet within the standard width.
4. Frictional drag is kept at a minimum, sealing by felt fibre contact on polished grooves instead of by compression.
5. Sealing ability is constant. Will not glaze. The resiliency of felt provides automatic correction for wear.
6. Provides the same lubricant space as in most off-standard bearings.
7. Simplifies design because of standard dimensions, saves space.

4388

SKF RED SEAL BEARINGS

SKF INDUSTRIES, INC., FRONT STREET & ERIE AVE., PHILADELPHIA, PA.

Immediate Shipment of Sheets, Channels, Angles and all other Steel Products

When a man's in a hurry for steel, he gets Immediate Action at Ryerson. Large and complete stocks of bars, angles, channels, rivets, welding rods, sheets, etc., up-to-date cutting and forming equipment, and speedy dispatching and delivery methods are coordinated to provide the Sheet Metal Worker with the steel he needs—at the time he needs it.

The large and complete stocks of Ryerson Certified Steels offer you the widest selection of products—products that represent the highest quality in each class of material. All Ryerson sheets (there are more than 25 different kinds) are of uniform high quality and assure excellent workability. They are all prime quality, carefully selected for finish, flatness, gauge and size accuracy. No seconds are ever carried.

You will save time, trouble and money by concentrating all your steel requirements with Ryerson—a dependable source for every steel need. If you do not have the current Ryerson Stock List, we will gladly send it.

RYERSON *Certified* **STEELS**

JOSEPH T. RYERSON & SON, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

PRINCIPAL PRODUCTS INCLUDE:

SHEETS:		Structurals	Strip
Hot Rolled	Panel and Sign	Channels, Angles	Plates
Galvanized	Deep Drawing	Tees, Zees	Tubing
Galvannealed	Enameling	Hoops, Bands	Bolts, Nuts
Copper Alloy	Stainless, etc.	Bars	Welding Rods, etc.

★

★ ★ ★ ***Thanks to the marvelous flexibility of the H & C No. 86 Design and the H & C interchangeability of frames and faces, the Colonel, like all other installers standardizing on these products, can meet practically any installation requirement without a moment's delay.***

H&C

No. 86 DESIGN

The All-Purpose Register with Turning Blade Valve

Provides 18 different air flows instantly obtained on the job — up, down or straight, combined with 6 different sideway deflections. No. 86 positively eliminates streaked ceilings in high sidewall installations; resistance is exceptionally low, and velocity is practically uniform over entire face, permitting smaller or fewer registers to be used. Face is very attractive and affords excellent concealment of the duct. In spite of its numerous superiorities, No. 86 is reasonably priced and is generally conceded to be *The Best Buy in Registers.*

Whether the job calls for sidewall or baseboard installation in old or new construction, to be used for heating or cooling, the combination of No. 86 faces and H & C frames will give you the perfect answer every time, and without guesswork. For, whether the No. 86 is to be located in the corner, center, or any other part of a room, the exact deflection, both horizontally and vertically, can be had by instant adjustment on the job.

Moreover, this combination will greatly reduce your stock investment. All that is required is a very limited number of frames and just two types of faces—one with projection and one without projection. If you are not thoroughly familiar with the many advantages that this offers, by all means, ask your H & C Jobber about it TODAY!

HART & COOLEY MANUFACTURING CO

Warm Air Registers • Air Conditioning Grilles • Damper Regulator Sets • Dampers • Chain • Pulley

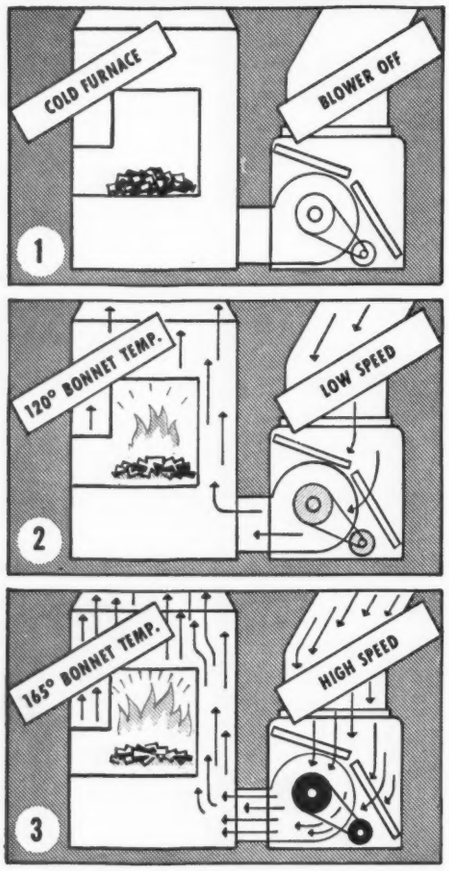
FACTORY AND ENGINEERING SALES OFFICE:

HOLLAND H&C **MICHIGAN**

Chicago Office: 61 W. Kinzie St. Philadelphia Office: 1600 Arch St.

While everybody's talking about
2-SPEED BLOWER OPERATION
VIKING'S *doing something about it!*

HOW HIGH-LOW WORKS



1. Blower is off when there is not sufficient heat for forced circulation — but can be switched on manually for summer cooling.

2. When bonnet reaches proper heat (about 120°), low speed starts, providing circulation without cold drafts.

3. Blower automatically switches to high speed when bonnet temperature reaches 165°. When fuel is consumed and temperature drops to 145° blower goes back to low speed automatically.

Low speed operation continues until bonnet temperature drops to 105° at which point blower operation automatically ceases, thus utilizing all available heat.

• Technical articles in trade journals, speakers on convention floors, engineers in research laboratories — all are talking today about 2-speed blower operation, and its importance to warm-air heating and air conditioning. It is hailed as the obvious answer to the shortcomings of intermittent firing and conventional blower operation. While others are **talking** VIKING is **acting.**

VIKING HIGH-LOW
Automatic
2-SPEED CONTROL

• Over a year ago VIKING introduced HIGH-LOW — a perfected 2-speed control system. Enterprising dealers were quick to see its advantages — more even heat distribution, longer circulation periods, elimination of heat stratification, greater efficiency and fuel economy. Today VIKING 2-speed conditioners are far out-selling conventional units, and thousands of home owners the country over are finding new comfort in warm air furnaces, thanks to HIGH-LOW.

• If you are interested in offering your customers the advantages of VIKING HIGH-LOW 2-speed operation, write for free descriptive literature.

VIKING AIR CONDITIONING CORPORATION
Main & Center Streets • Cleveland, Ohio

VIKING AIR CONDITIONING CORPORATION

ANNOUNCEMENT

WE are pleased to announce the purchase of the business of The Globe Ventilator Co., established in 1876 at Troy, New York. This includes the trade-marked Globe name and good-will; as well as their warehouse stocks, dies and machinery.

Osborn will continue the manufacture of Globe Ventilators in a full range of sizes, retaining the Globe name and marketing policy. All manufacturing operations will be conducted in our Cleveland plant and Osborn wishes to assure the trade that our experience and the unusually high standards of our manufacturing department will be used to maintain the long-established Globe reputation for dependable quality.

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO · CLEVELAND · DETROIT
Metals and Metal Products

A DEPENDABLE SOURCE OF SUPPLY FOR 80 YEARS

"Now we can enjoy Automatic Heat and Humidification

NO MORE DRAPERIES AND WOODWORK RUINED BY EXCESSIVE CONDENSATION.
OUR STORM SASH
HAS MADE OUR MODERN HEATING PLANT PRACTICAL."

That's what one home owner said about Window Conditioning (Storm Sash). Thousands of home owners across the country are reporting similar experiences . . . together with amazing savings in fuel costs.

And thousands of new prospects for automatic heating and air-conditioning equipment are being created by L·O·F Window Conditioning advertising—forceful, compelling advertising appearing again this fall in leading national magazines. Window Conditioning brings your equipment within the reach of more and more people because:

1. **It reduces fuel bills up to 30 per cent.**
2. **It helps get rid of the nuisance of foggy windows—excessive condensation that damages draperies, rugs and woodwork finishes.**
3. **It permits the use of smaller and less costly heating equipment.**

For bigger sales of *your* equipment, recommend Window Conditioning in your contacts with building contractors, home owners and prospective home builders.

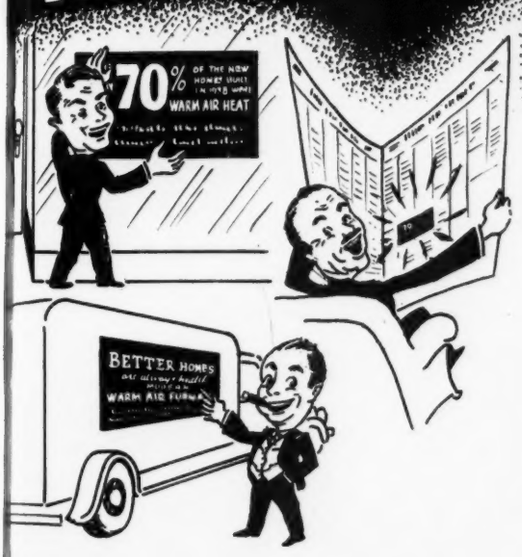
. . .

Libbey·Owens·Ford Glass Company, Toledo.

LIBBEY·OWENS·FORD *QUALITY GLASS*

LOOK FOR THE LABEL

Campaign to Promote WARM AIR HEATING BUSINESS Recieves Tremendous Ovation!



DEALERS EVERYWHERE ARE PLEDGING THEIR CO-OPERATION . .

Have You ?---

Come on! Get on the bandwagon . . . take full advantage of this great advertising campaign designed to promote the Warm Air Heating Dealer's general business, no matter what make of furnace he handles. Announced last month, this gigantic campaign has so stimulated the interest of the Warm Air Dealers everywhere that hundreds and hundreds have written and requested the window streamers that will definitely identify them as being tied-up with this tremendous newspaper campaign . . . and the logical man to do this work. It is still not too late to join in. Get your streamers, put them up, and derive the benefit of this advertising. All is absolutely FREE. There is no charge for anything. All that is asked is that if you request streamers, you use them in most conspicuous places . . . your store window, on your trucks, etc. This campaign is being run for you . . . make the most of it . . . Send in your name and address, and the amount of each of each streamer you want, at once.

NEWSPAPER ADS TO STIMULATE WARM AIR HEATING AND REPAIRING JOBS . . .

MORE THAN 70% OF THE NEW HOMES BUILT IN 1938 WERE WARM AIR HEATED
This sign is your guide to the Warm Air Heating Contractor who will tell you why.

Five different advertisements will be inserted in newspapers throughout the country with a total daily circulation of better than 1,500,000 readers. Each ad will be run three times a week, making a total of 15 insertions in five weeks. These advertisements will all bear the slogan "This is your sign to the Warm Air Heating Contractor who will tell you why."

WINDOW STREAMERS FURNISHED FREE TO IDENTIFY YOU AS THE LOGICAL PERSON TO DO THIS WORK

A series of Window Streamers, printed in red and white for utmost attention value, and carrying the same wording as the weekly newspaper ads, will be mailed you, upon request. These streamers 20x10 inches in size are legible at quite a distance and are excellent for display in your window or on your trucks. Send for as many as you can use, and the correct ones in the series will be sent you each week.

Now is the time to have your
WARM AIR FURNACE
CLEANED AND REPAIRED
This sign is your guide to the Warm Air Heating Contractor who will tell you why.

Join the Parade . . . TIE IN WITH THIS TREMENDOUS CAMPAIGN DESIGNED TO PROMOTE YOUR SALES

Write Now! Ask for the window streamers! Give your support to this campaign for it is being conducted for you. Aggressive dealers will take advantage of this advertising and get the bulk of the business in their territory. Do not hesitate, send in your name and address at once!

HIS CAMPAIGN IS SPONSORED BY THE FOLLOWING DISTRIBUTORS OF
EPAIR PARTS TO FIT ALL MAKES OF FURNACES • BOILERS and STOVES

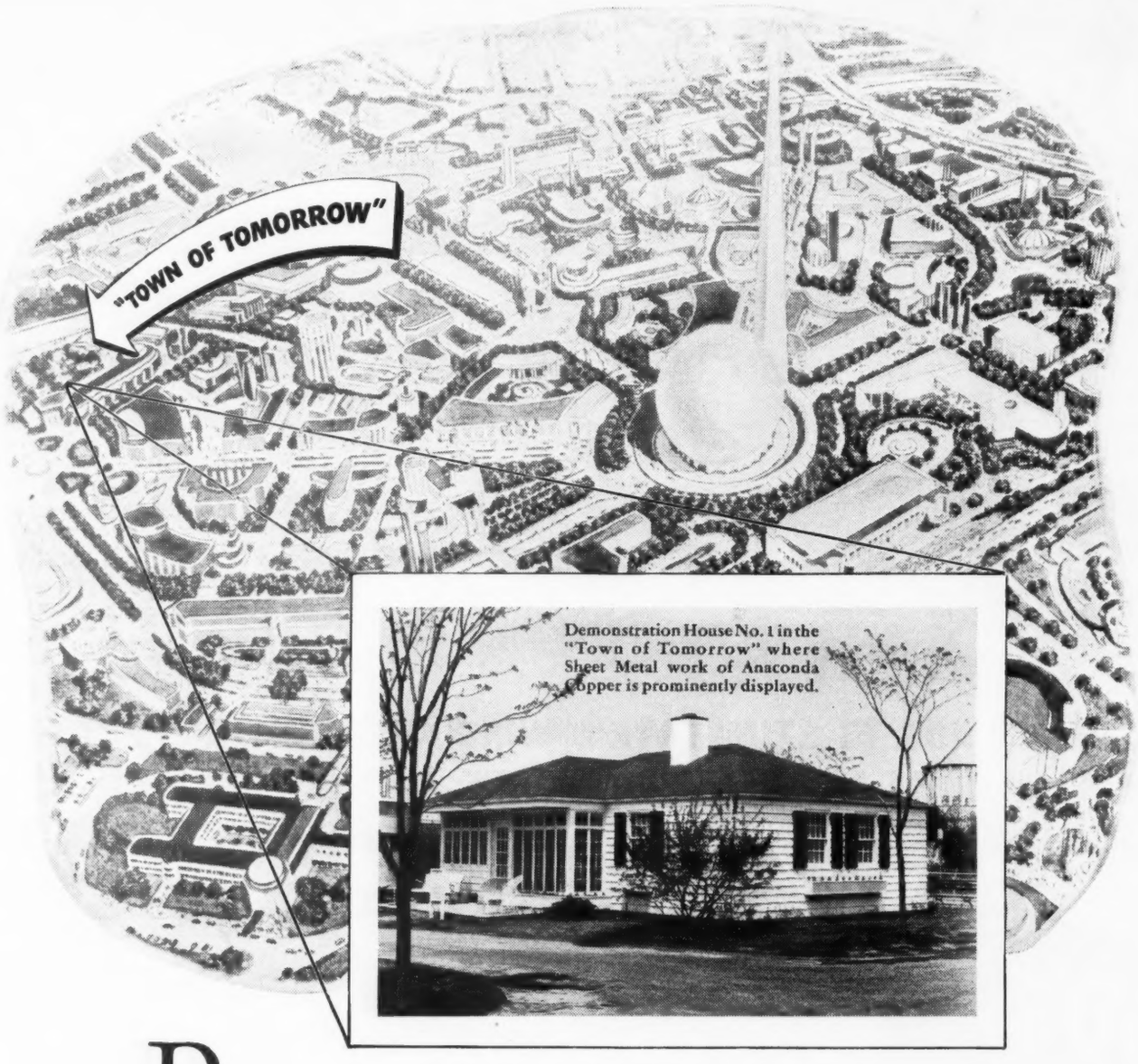
NORTHWESTERN STOVE REPAIR CO.
662 WEST ROOSEVELT RD. Established 1872 CHICAGO, ILLINOIS

CAPITOL FURNACE & STOVE REPAIR CO.
523 E. WASHINGTON ST. INDIANAPOLIS, INDIANA

PENINSULAR STOVE CO.
2699 GRATIOT AVE. DETROIT, MICHIGAN

CENTRAL FURNACE & STOVE REPAIR CO.
3937 OLIVE ST. ST. LOUIS, MISSOURI

IPE • FITTINGS • REGISTERS • FURNACES • FILTERS • BLOWERS
AS RANGES • COAL STOVES • HEATING and COOKING EQUIPMENT


"TOWN OF TOMORROW"
Demonstration House No. 1 in the "Town of Tomorrow" where Sheet Metal work of Anaconda Copper is prominently displayed.

Prospects by the thousands

Many of the millions attending the New York World's Fair will visit its homebuilding feature, the "Town of Tomorrow." Among them, many people from your own town will inspect these outstanding homes with their many features for gracious, modern living.

Gutters, leaders and flashings of Anaconda Copper are prominently displayed in House No. 1 where this quality product is forcefully brought to the attention of every visitor. Replicas of this House are being built as model display homes throughout the country.

As a result, millions of prospective homebuilders are learning about the advantages of sheet metal work of Anaconda Copper. Here are "Prospects by the thousands" for contractors using this well-known brand.

3976

Visit the Copper & Brass Industry Exhibit in the Metals Building, New York World's Fair—1939.

©N.Y.W.F.

ANACONDA
from mine to consumer

Anaconda Copper & Brass

THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Connecticut

Subsidiary of Anaconda Copper Mining Company • In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

NEW PRICES! NEW POLICY! NEW PRODUCT!

IN THIS COMPLETE LINE OF DIRECT-FIRED CONDITIONERS

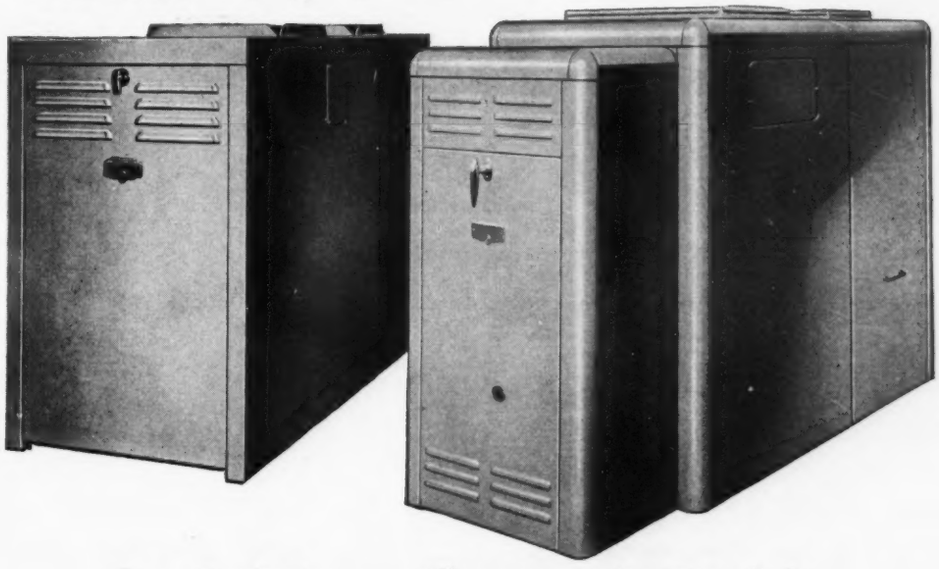
FITZGIBBONS *Directaire*

Built in seven sizes, covering a range from 80,000 B.t.u. to 600,000 B.t.u. Sturdily designed, adapted to any fuel, any type of mechanical firing. Fitzgibbons welded steel construction, simple installation, easy access to controls, beautifully enameled jacket. The Fitzgibbons Directaire is at home in the basement of the finest mansion, yet is available in sizes and at prices that bring dependable Fitzgibbons air conditioning to the five and six room house.

NEW PROFITS, TOO,

for the dealer who is on his toes to tie in with the big new market of air conditioning, not only in quality homes, but in small, low cost houses as well! Here is the profit opportunity for which many alert dealers have been watching.

The Fitzgibbons Directaire has been priced to present market conditions. With these new prices and the new, liberal Fitzgibbons dealer policy, the road is open to success in a vastly expanded field.



FITZGIBBONS COVERS THE COMFORT FIELD!

Some territories are still open. Write Dept. A. A. today for details

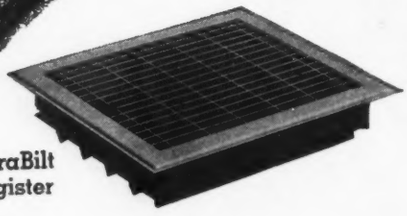
Fitzgibbons Boiler Company, Inc.

GENERAL OFFICES
Architects Building, 101 Park Avenue, New York, N. Y.
Works: OSWEGO, N. Y.
Branches and representatives in principal cities

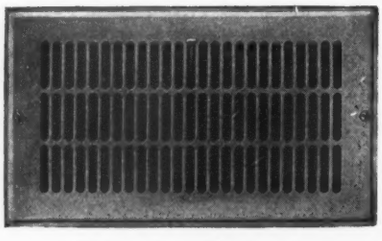
AUER provides a COMPLETE Line of Registers

for ALL Air Conditioning & Gravity Uses!

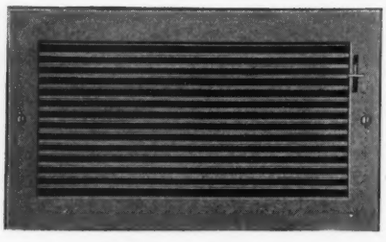
No matter what your requirements—in style, finish, size, material, or air directional design—Auer is equipped to give you outstanding quality and intelligent service. The Auer line covers *all* needs—gravity, air conditioning, ventilating, etc. Register, intake, and grille faces to suit *any* conditions and architectural schemes. A service so complete is of exceptional value to all heating and air conditioning contractors. Make Auer Registers YOUR Registers!



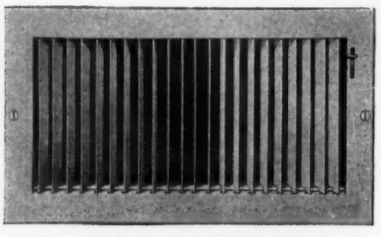
DuraBilt Register



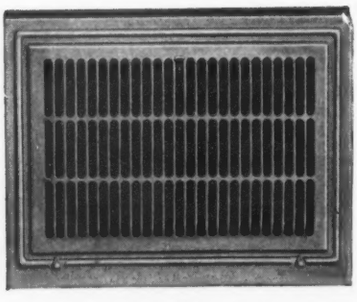
2030 CLASSIC Wall Register



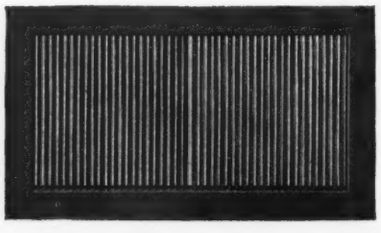
5030 Fin-Flex Register



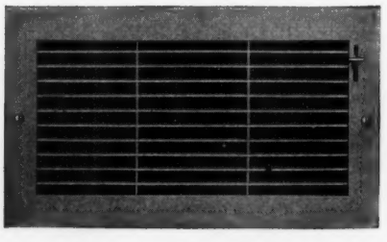
8130 Dura-Flex Register



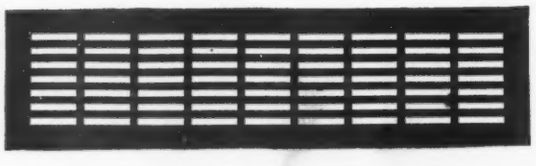
600 Elite Two-Piece Register



9000 Fin-Flex Grille

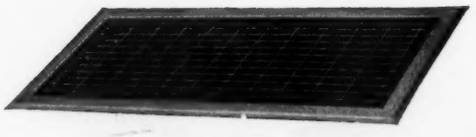


8530 Dura-Flex Register



31A Grille

Consult your jobber—or write us direct for Auer Register Book 39, illustrating all models.



DuraBilt Cold Air Face

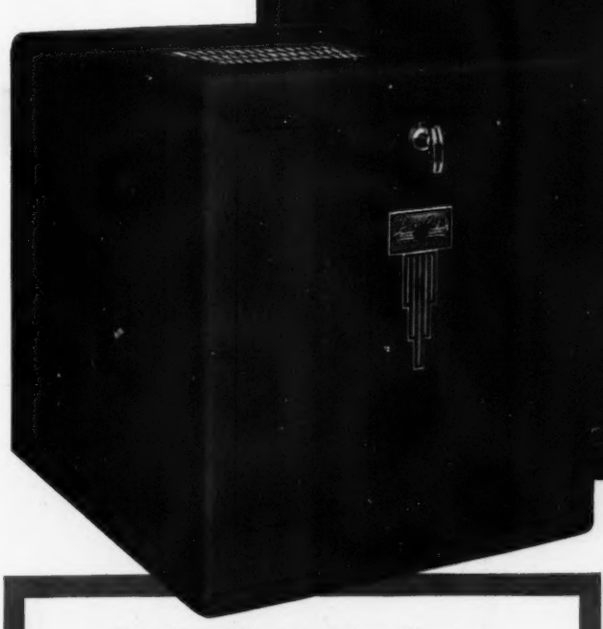
THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

AUER DISTINCTIVE REGISTERS & GRILLES For Air Conditioning *and* Gravity

PEERLESS ANNOUNCES

a New Line of Package Units

For Direct Drive and Belt Drive Blowers...



CONSTANTLY meeting the demands of discriminating users, Peerless announces this 1940 line of package units equipped with a Direct Drive or Belt Drive Blower.

The cabinets are heavy gauge metal with an attractive green krinkle finish and are fitted with chromium lock-type inspection door handles. The rounded corners and tailored lines harmonize perfectly with new or old furnaces and add to the modern basement.

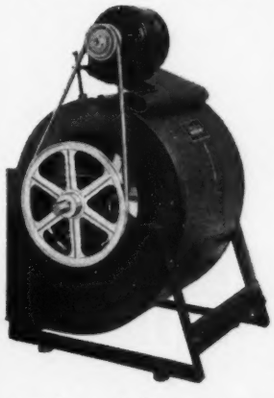
For New or Remodeled Installations

Designed for attachment to any style furnace, oil, gas or coal, Peerless cabinets are adaptable for all installations.

Peerless Direct Drive Blowers

Peerless Direct Drive Blowers are supplied in standard and deluxe models. *Deluxe units* have Peerless eight-speed controller permitting the selection of any three of eight speeds, manually operated, or any two of eight speeds with automatic two-speed bonnet control. *Standard units* are furnished with a three-speed motor when two-speed bonnet control is used. Or any one of the three speeds may be selected for blower operation.

Top or Rear Mounted Belt Drive Blowers



Peerless Belt Drive Blowers can be furnished with motor mounted in the rear or on top of the scroll. It is possible to change from a rear mounted motor to a top mounted motor in the field, and the only additional equipment necessary will be a longer belt and the top mounting plate. The feature of the Peerless rear mounted blower is the removal of the motor, when servicing is necessary, without removing any bolts or screws or hinges. This motor is readily lifted from its pivoting socket. Besides being resilient mounted this arrangement also provides automatic belt tension.

THE Peerless ELECTRIC CO.

FAN AND BLOWER DIVISION • WARREN, OHIO

Mail this coupon for complete information

PEERLESS ELECTRIC CO. • WARREN, OHIO

Please send complete details of your Direct and Belt Drive Blowers to:

Name_____

Address_____

Town_____ State_____

INDEPENDENT "FABRIKATED" *Continues to Lead*

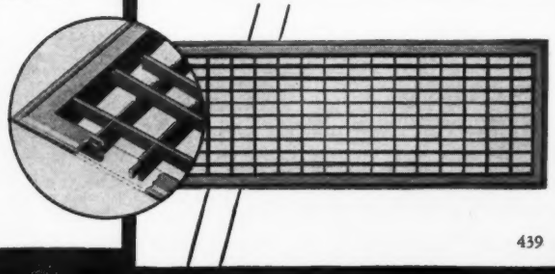
● "Fabrikated" construction—originated by Independent more than twenty years ago—still remains the most efficient and the best looking the market affords. Improvements and refinements have continually been made but the design, being basically correct, has not been radically changed. Compare the first models with those of 1939 and you will see a distinct kinship. It can truly be said that Independent "Fabrikated" Registers, Grilles and Cold Air Faces are never outmoded.

Specify the original "Fabrikated," made by Independent, and you can be assured the installation will present the finest appearance and give the utmost satisfaction in every particular.

Write for catalog

THE INDEPENDENT REGISTER CO.
3747 East 93rd Street **Cleveland, Ohio**

Independent "Fabrikated" Registers and Cold Air Faces are strong and rigid, and give large open area. The bars composing the grille are forced together under tremendous pressure, making it substantially one solid piece. The ends of the bars are clinched outside the frame so that each member is a sustaining unit.



439

INDEPENDENT "Fabrikated" (REG. U. S. PAT. OFF.)

FLOOR REGISTERS AND COLD AIR FACES
AND AIR CONDITIONING REGISTERS AND GRILLES

NOW—see the Profit set-up of a GE Dealer Franchise!

IT HEATS • IT HUMIDIFIES • IT FILTERS • IT CIRCULATES

Right Now...
An immediate opportunity to cash in on the big news of the industry!

New G-E Winter Air Conditioners AT NEW LOW PRICES!

PROFITS from more than just a warm air furnace and a fan—in fact, from the finest Winter Air Conditioners (Oil or Gas) G-E has ever made. And now—*new* profits from *new low prices:*

Lower the price, add many improvements in design and operation to an already superior mechanism, reduce the size and weight (easier handling and intallation) while maintaining maximum efficiency, economy, comfort, convenience, safety and all the other qualities G-E Winter Air Conditioners are famous for. Do all that—which is exactly what G-E has done for you—*and you've got something to sell—at a better profit than ever before!*

PROFITS from Split Systems. The last word in controlled automatic *warm air heat plus winter air conditioning.* (A G-E Oil or Gas Furnace with a G-E Winter Air Conditioner.) With this you can install a summer cooling unit. Added profits for you.

PROFITS from Air Conditioning. From small units for cooling one room or office to complete systems for cooling entire homes, stores, shops, hotels, theatres, etc. *Plus* Condensing Units from fractional h.p. to 100 h.p. *Plus* profits from Air Circulators.

PROFITS the year 'round! *One* company, *one* high standard of quality, *one* source for all products. G-E gives its Franchise Dealers *complete* lines priced to permit profits. That permit selling *every* prospect, *every* month in the year!

Now as never before General Electric is ready to talk profits—Find out the potentials of a G-E Dealer Franchise—Now!

GENERAL ELECTRIC

Automatic Heating, Cooling and Air Conditioning

GENERAL ELECTRIC COMPANY
Div. 190-553, Bloomfield, New Jersey

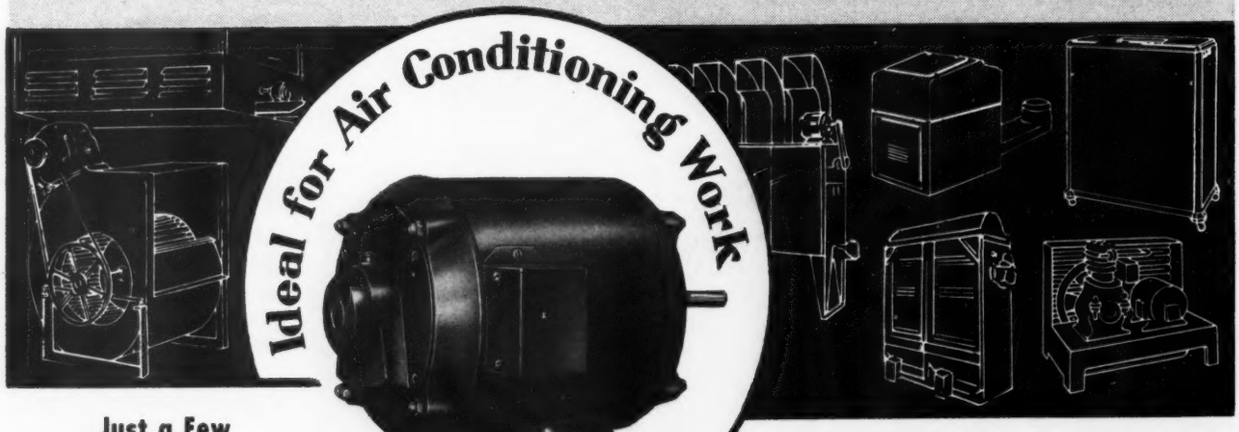
Give me details about the new G-E Dealer Franchise for my territory.

NAME.....

STREET.....

CITY.....STATE.....

Century RS MOTORS Give You Least Voltage Drop at Starting



Just a Few CENTURY Motor Features

Starts With Amazing Quietness . . . Groans and grunts from starting can be more disturbing than noise from running.

Run Quietly . . . Air Conditioning comfort must be quiet comfort.

Hard to Start Loads . . . Ability to start and bring the modern compressor loads up to speed, without overmotoring the running load.

Thermal Overload Built-in Protection . . . Very low cost protection. Most fractional sizes available. Listed by Underwriters. Protects two ways—over current—over temperature. Test this protection yourself and be convinced.

Long Life Construction . . . Ask about the large bearings machined from phosphor bronze castings—with greater resistance to trouble from amateur belt adjustments. The unique bearing bumpers that reduce chatter from V-belt vibration. Century wool yarn oiling system (fractional sizes) that lubricates for at least a year without attention.

WITH Century's Repulsion Start Induction Single Phase Brush Lifting Motors there is the least voltage drop and light flicker at starting, for this type of motor has the highest starting torque and lowest starting current of any of the single phase group. Because light flicker is often an annoying problem in air conditioning installations, this is an added reason why Century type RS Motors are ideal for air conditioning work.

Because of these facts and the additional Century Motor Features listed on this page you'll make more friends for your products when you standardize on Century Motors.

A complete range of sizes ⅛ to 40 horse power makes it easy to correctly match any application.

For blowers, fans, stokers, oil burners, unit heaters, packaged cooling units, refrigerating compressors, etc., Century RS Motors are ideal.

The excellent appearance matches modern appliance design — often an important selling feature, too.

The Century Motor Specialist nearest you will gladly tell you more about Century Motors—assist you in their correct selection and application. His experience is always at your service — call him in.

DEALERS: Write today for interesting, informative free bulletins on the Installation — Care — Adjustment of Century Motors. Ask for Bulletin A-9.

Century Motor Specialization
+Correctly Engineered Application
=Satisfaction and Economy

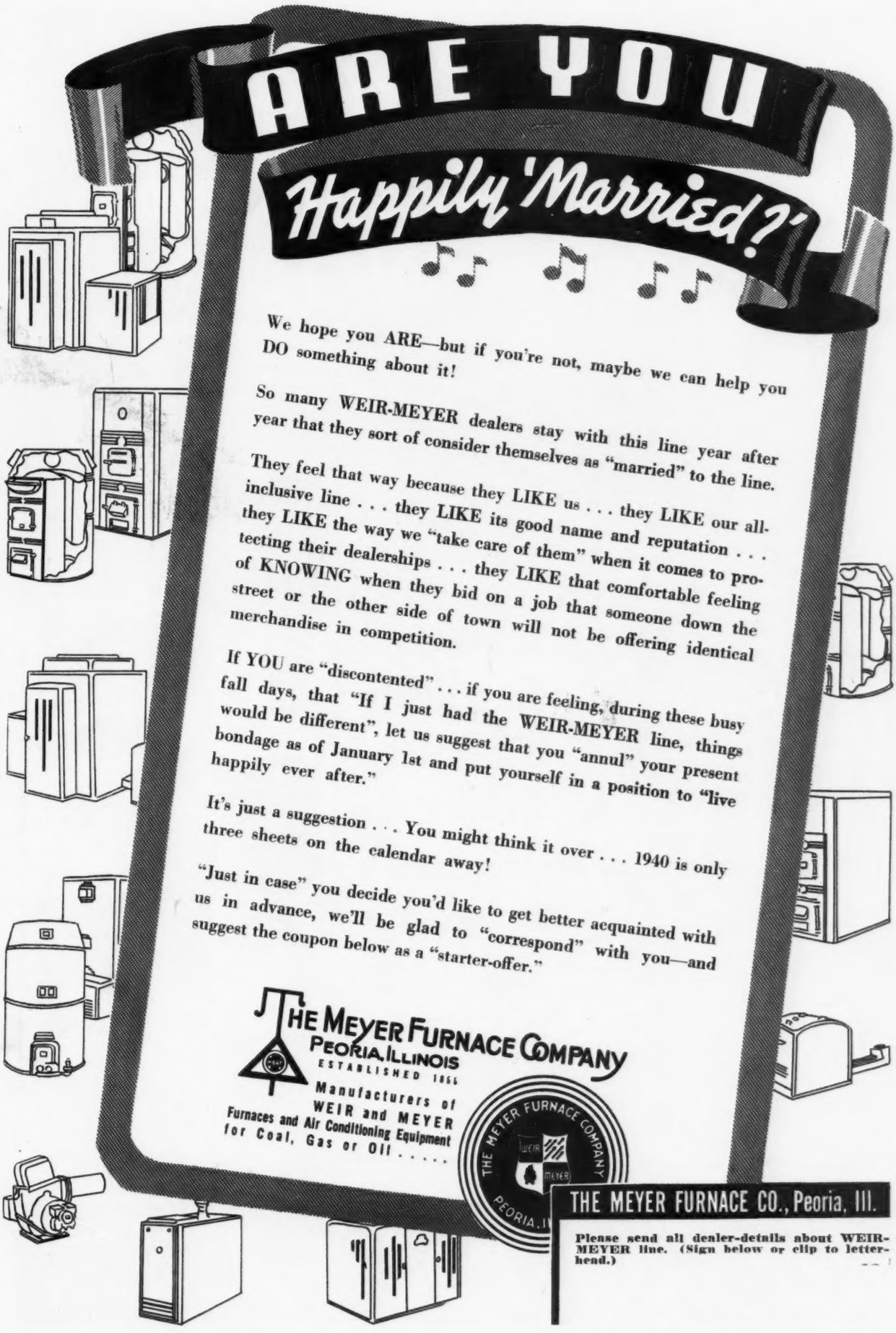
CENTURY ELECTRIC COMPANY
1806 Pine Street ST. LOUIS, MO.

Offices and Stock Points in Principal Cities

Atlanta • Baltimore • Boston • Buffalo • Chicago • Charlotte • Cincinnati Cleveland • Dallas • Denver • Davenport • Detroit • Houston • Indianapolis • Kalamazoo • Kansas City • Los Angeles • Milwaukee • Minneapolis • New Orleans • New York • Omaha • Philadelphia • Pittsburgh Rochester • Salt Lake City • San Francisco • Spokane • Seattle • Tulsa

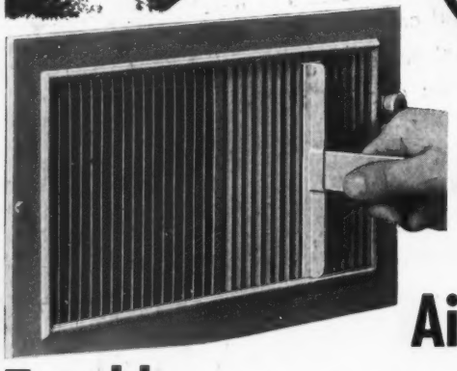
Century MOTORS

One of the Largest Exclusive Motor Manufacturers in the World


ARE YOU
Happily Married?
We hope you ARE—but if you're not, maybe we can help you DO something about it!
So many WEIR-MEYER dealers stay with this line year after year that they sort of consider themselves as "married" to the line.
They feel that way because they LIKE us . . . they LIKE our all-inclusive line . . . they LIKE its good name and reputation . . . they LIKE the way we "take care of them" when it comes to protecting their dealerships . . . they LIKE that comfortable feeling of KNOWING when they bid on a job that someone down the street or the other side of town will not be offering identical merchandise in competition.
If YOU are "discontented" . . . if you are feeling, during these busy fall days, that "If I just had the WEIR-MEYER line, things would be different", let us suggest that you "annul" your present bondage as of January 1st and put yourself in a position to "live happily ever after."
It's just a suggestion . . . You might think it over . . . 1940 is only three sheets on the calendar away!
"Just in case" you decide you'd like to get better acquainted with us in advance, we'll be glad to "correspond" with you—and suggest the coupon below as a "starter-offer."
THE MEYER FURNACE COMPANY
PEORIA, ILLINOIS
ESTABLISHED 1865
Manufacturers of
WEIR and MEYER
Furnaces and Air Conditioning Equipment
for Coal, Gas or Oil . . . . .
THE MEYER FURNACE COMPANY
WEIR
MEYER
PEORIA, ILL.
THE MEYER FURNACE CO., Peoria, Ill.
Please send all dealer-details about WEIR-MEYER line. (Sign below or clip to letter-head.)

Who's Afraid of the BIG BAD WOLF?

Smoke Tests Tell the Whole Story



4-Way Adjustability Eliminates Air Distribution Troubles — *Costs But a Few Cents More*

Faulty air distribution is the big, bad wolf of air conditioning! Engineers estimate it causes OVER 30% of all "kickback" installations.

Supposing you are stuck with one of these "sour" jobs—and you've used old-fashioned, non-adjustable registers. What can you do to make your customer happy, and get your money on time? NOT MUCH—at least without terrific expense.

That's why smart contractors are turning to AIR CONTROL Registers. **AIR CONTROL fully protects them on every job—yet costs but a few cents more per register.**

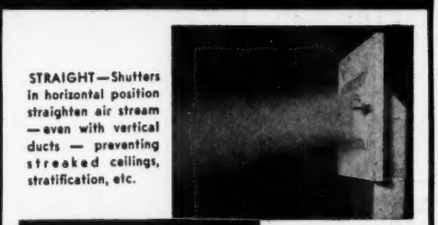
With AIR CONTROL you get complete 4-way adjustability . . . adjustments EASILY made in a few seconds, **even after installation.** No matter what the air flow requirements for customer satisfaction, YOU CAN MAKE THEM!

SEE YOUR JOBBER!

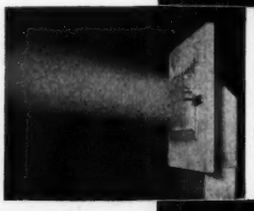
AIR CONTROL offers improvements unheard of a year ago—so different, so advanced! Use these registers to help you sell jobs—then to ASSURE satisfactory results. Ask your jobber to demonstrate, and get from him our surprisingly low prices.

If you don't know who handles AIR CONTROL nearby, write us for details.

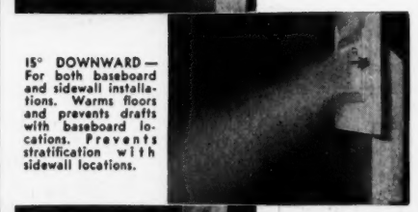
AIR CONTROL PRODUCTS, Inc.
Muskegon, Mich.



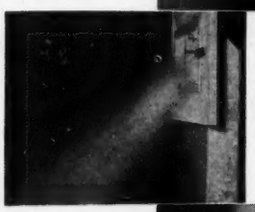
STRAIGHT—Shutters in horizontal position straighten air stream—even with vertical ducts — preventing streaked ceilings, stratification, etc.



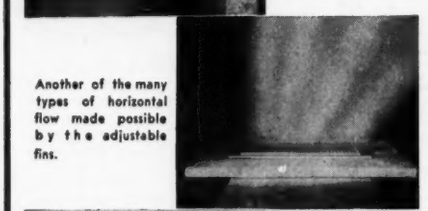
15° UPWARD DEFLECTION — Ideal for cooling installations — prevents drafts, even with low ceilings.



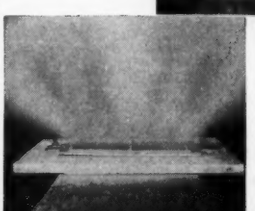
15° DOWNWARD — For both baseboard and sidewall installations. Warms floors and prevents drafts with baseboard locations. Prevents stratification with sidewall locations.



30° DOWNWARD — Gives perfect distribution with low sidewall locations.



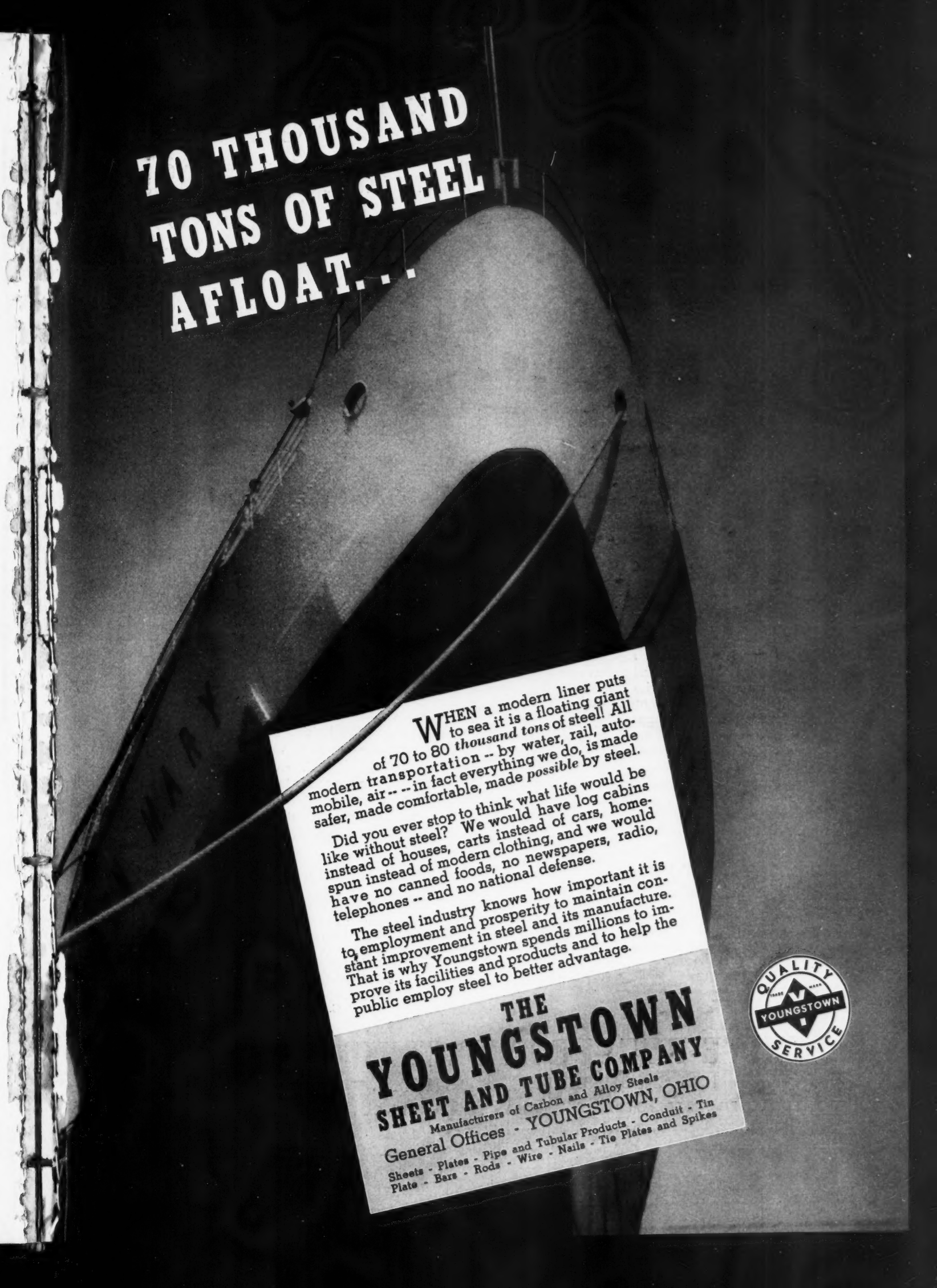
Another of the many types of horizontal flow made possible by the adjustable fins.



Photograph shows widespread horizontal directional control. Increases diffusion and prevents drafts.

Air-Control

Registers and Grilles for Air Conditioning


70 THOUSAND
TONS OF STEEL
AFLOAT...
WHEN a modern liner puts to sea it is a floating giant of 70 to 80 *thousand tons* of steel! All modern transportation -- by water, rail, automobile, air -- -- in fact everything we do, is made safer, made comfortable, made *possible* by steel.
Did you ever stop to think what life would be like without steel? We would have log cabins instead of houses, carts instead of cars, homespun instead of modern clothing, and we would have no canned foods, no newspapers, radio, telephones -- and no national defense.
The steel industry knows how important it is to employment and prosperity to maintain constant improvement in steel and its manufacture. That is why Youngstown spends millions to improve its facilities and products and to help the public employ steel to better advantage.
THE
YOUNGSTOWN
SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices - YOUNGSTOWN, OHIO
Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes
QUALITY
YOUNGSTOWN
SERVICE

EVER HAVE THIS TROUBLE
WITH LOW REGISTER TEMPERATURE JOBS?

Low Temperature Settings Don't Affect the Accuracy of WHITE-RODGERS *"Hydraulic-Action"* Fan Controls

COLD air blowing from a register due to faulty operation of a fan control means customer dissatisfaction and costly service calls. White-Rodgers "Hydraulic-Action" fan controls can never cause this trouble because their action is just as positive at the low temperatures required in modern installations as at high temperatures. The "Hydraulic-Action" principle prevents sluggish action at low temperatures because operation is obtained through the powerful action of a solid-liquid charge which expands or contracts at a uniform rate for each degree of temperature change. Manual testing of switch operation during installation does not destroy the calibration of "Hydraulic-Action" controls.

Adjustments are easily made on these blower controls because cut-in and cut-out temperatures are set on accurately graduated visible dials. There are no trial-and-error adjustments to waste the installer's time. Why not specify White-Rodgers "Hydraulic-Action" controls on your next job and see for yourself? The White-Rodgers line also includes limit controls, thermostats, stoker timers, etc. Complete information will be sent on request.

SINGLE SPEED FAN CONTROL
"Hydraulic-Action"

Provides positive control at low temperature settings. All adjustments made on visible dial uniformly calibrated from 100 to 300 degrees F. Knob or key adjustment optional. Adjustable differential 10 to 80 degrees F. Motor ratings: 1½ hp 120 or 240 v. A. C.—¾ hp 115 or 230 v. D. C.

TWO SPEED FAN CONTROL
"Hydraulic-Action"

Provides progressive control; off-low-high on temperature increase. Consists of two separate controls in one case, so that high and low speed adjustments are completely independent. All adjustments made on accurately calibrated visible dials. Motor ratings: 1½ hp 120 or 240 v. A. C.—¾ hp 115 or 230 v. D. C.

WHITE-RODGERS ELECTRIC CO.
1215 CASS AVENUE, ST. LOUIS, MO.

CONTROLS FOR REFRIGERATION • HEATING • AIR-CONDITIONING

AS NEAR AS YOUR TELEPHONE

THERE'S A STOCK OF

SUNBEAM

FURNACES

Visit our exhibits at the New York World's Fair and Golden Gate Exposition

FROM COAST TO COAST

● Many times the delivery date of a Furnace will make or break a sale. So sell Sunbeam Furnaces and be sure of getting what you want, when you want it. In the 150 principal cities below, stocks of Sunbeam Furnaces are ready for immediate delivery. There are units of cast iron and steel, in all sizes, all prices, for all fuels. Mail the coupon today.

ALABAMA
Birmingham
Mobile
Montgomery

ARIZONA
Phoenix

CALIFORNIA
Sacramento
San Francisco

COLORADO
Denver
Grand Junction
Pueblo

CONNECTICUT
Bridgeport
Danbury
Hartford
New Britain
New Haven
Norwalk
Norwich

DELAWARE
Wilmington

DISTRICT OF COLUMBIA
Washington

FLORIDA
Jacksonville
Miami

GEORGIA
Atlanta

IDAHO
Nampa
Weiser

ILLINOIS
Champaign
Chicago
Christopher
Danville
Elgin
Joliet
Peoria
Quincy
Rockford
Rock Island
Springfield

INDIANA
Evansville
Fort Wayne
Indianapolis
Muncie
South Bend

IOWA
Des Moines
Dubuque
Ottumwa
Sioux City

KANSAS
Wichita

KENTUCKY
Hopkinsville
Lexington
Louisville
Paducah

LOUISIANA
New Orleans

MAINE
Lewiston
Portland

MARYLAND
Baltimore
Cumberland
Hagerstown

MASSACHUSETTS
Boston
Brockton
Pittsfield
Springfield
Worcester

MICHIGAN
Bay City
Detroit
Flint
Grand Rapids
Jackson
Lansing
Pontiac
Port Huron

MINNESOTA
Duluth
Minneapolis
St. Paul

MISSOURI
Kansas City
Joplin
St. Louis
Springfield

MONTANA
Butte

NEBRASKA
Omaha

NEW JERSEY
Asbury Park
Newark
New Brunswick

NEW MEXICO
Albuquerque

NEW YORK
Albany
Auburn
Binghamton
Brooklyn
Buffalo
Elmira
Glens Falls
Middletown
New York
Poughkeepsie
Rochester
Sayville, L. I.
Syracuse
Utica
Watertown

NORTH CAROLINA
Asheville
Charlotte
High Point
Raleigh

NORTH DAKOTA
Fargo

OHIO
Akron
Ashtabula
Canton
Cincinnati
Cleveland
Columbus
Dayton
Mansfield
Newark
Portsmouth
Toledo
Youngstown
Zanesville

OKLAHOMA
Oklahoma City

OREGON
Portland

PENNSYLVANIA
Altoona
Bethlehem
Erie
Lewistown
Philadelphia
Pittsburgh
Reading
Scranton
Sunbury
Wilkes-Barre
York

RHODE ISLAND
Providence

SOUTH CAROLINA
Columbia

SOUTH DAKOTA
Sioux Falls

TENNESSEE
Chattanooga
Johnson City
Knoxville
Memphis
Nashville

TEXAS
Dallas
San Antonio

UTAH
Salt Lake City

VERMONT
Rutland
St. Johnsbury

VIRGINIA
Danville
Richmond
Rosslyn
Staunton

WASHINGTON
Seattle
Spokane
Yakima

WEST VIRGINIA
Huntington
Parkersburg

WISCONSIN
La Crosse
Milwaukee

AMERICAN RADIATOR & Standard Sanitary CORPORATION

Copyright September 1939, American Radiator and Standard Sanitary Corporation

SUNBEAM

WARM AIR FURNACES AND AIR CONDITIONING UNITS

American Radiator & Standard Sanitary Corp.
Elyria, Ohio

Gentlemen: Please send me by return mail the name and address of the Sunbeam Jobber nearest me. Also full details on the complete line.

Name_____

Address_____

City_____ State_____

A.A.—9-39

CASH IN on Farm Jobs, too

with rust-fighting Beth-Cu-Loy sheets

THERE'S plenty of profitable sheet metal work down on the farm these days: small outbuildings, storage bins, roofing and siding, barn ventilators, gutter-work.

Go after these money-making jobs with Beth-Cu-Loy galvanized steel sheets, the copper-bearing sheets that fight rust, greatly increase service life, and help bring repeat business from satisfied customers.

Impartial tests prove that steel of Beth-Cu-Loy composition outlasts ordinary sheet steel two to one. Yet Beth-Cu-Loy steel sheets cost very little extra—only a few cents more per dollar of investment.

Point out these advantages of using Beth-Cu-Loy copper-bearing galvanized steel sheets when you talk to your farm prospect. He'll be quick to see the extra value you offer him—and he'll pass the word on to his neighbors. Even if your first Beth-Cu-Loy job for him is a small one, you'll be opening up a profitable new field you may have been overlooking.

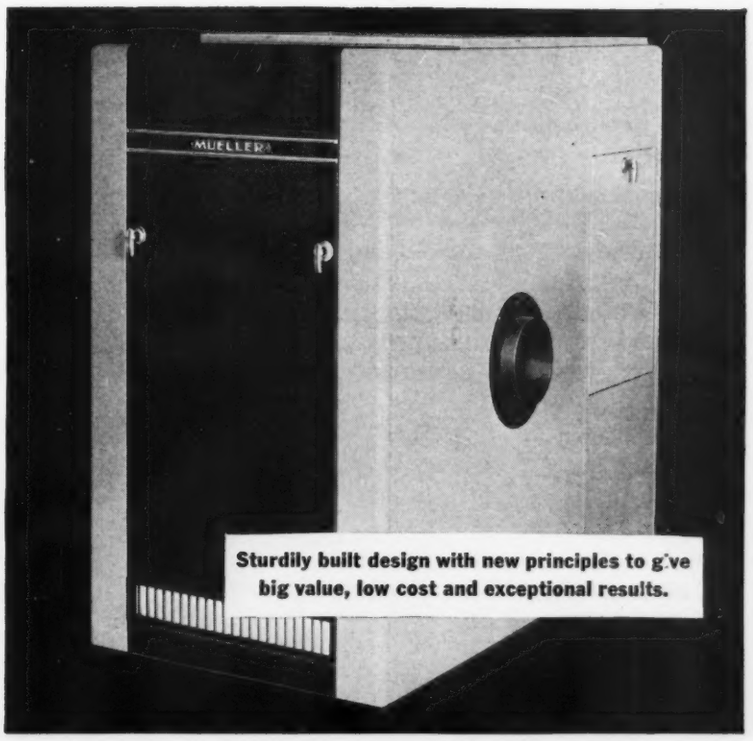
Your distributor can supply you with Beth-Cu-Loy galvanized sheets

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

NEW→

LOW PRICE OIL FURNACE *SENSATION*



Sturdily built design with new principles to give big value, low cost and exceptional results.

MUELLER SERIES FIFTY

Opens Door to Volume Sales in Low Cost Home Market

Now you can have a typical Mueller quality Oil-Fired, Air Conditioning Furnace at the lowest price in Mueller history. This sturdily built beauty puts to shame the clutter of cheap, inefficient units which have been rushed on the market lately. It has eye-appeal—it has price appeal. Its design assures topmost efficiency.

Looks like a million, sells for a mite

Mueller's Series Fifty has a deluxe appearance which belies its low price. This attractive furnace opens the volume market in a big way. It enables you to sell your small home customers quality automatic oil heat and winter air conditioning at a price that is in keeping with the small home budget.

Regularly supplied with Mueller vaporizing or pressure atomizing burner. Also available without burner. Adaptable to most any make oil burner. Send coupon for full information.

MUELLER'S NEW SERIES FIFTY CAN MAKE MONEY FOR YOU! *AND HOW!*

The small home market is booming. Homeowners want the comforts and convenience of automatic oil heat — economically. Mueller's Series Fifty is built right and priced right to get a big share of this business for you. Send coupon today for literature.

L. J. MUELLER FURNACE CO., 2010 W. Oklahoma Avenue, Milwaukee, Wis.

MUELLER (M) MILWAUKEE

HEATING AND AIR CONDITIONING

COAL • OIL • GAS

CLIP AND MAIL TODAY

L. J. MUELLER FURNACE CO.
2010 West Oklahoma Avenue, Milwaukee, Wisconsin

Please send literature and full information on the new Mueller Big Value, Low Price Series Fifty Air Conditioning Oil Furnace.

Name_____

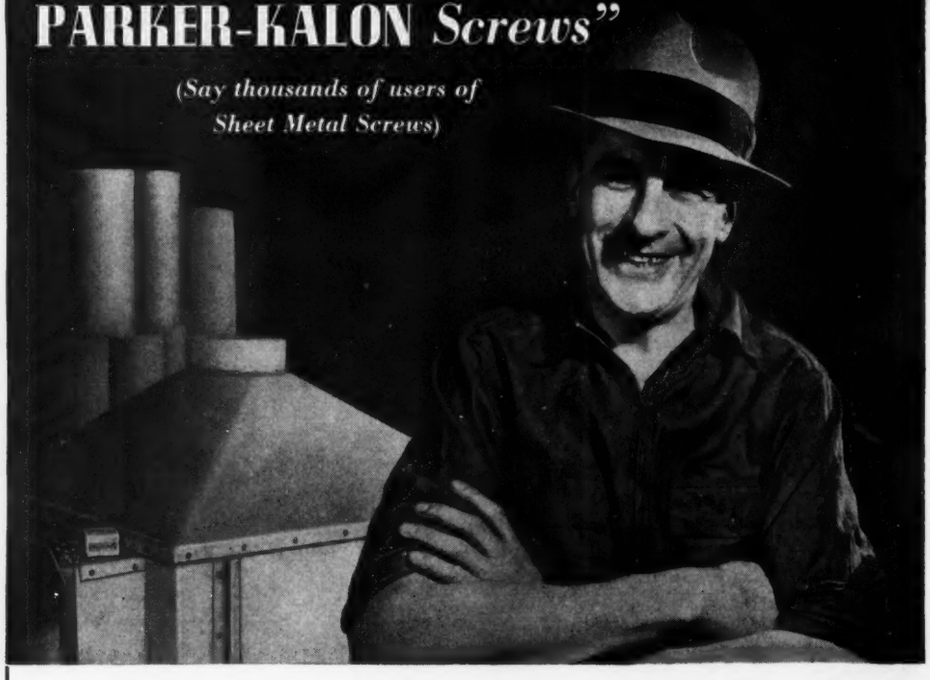
Address_____

City_____ State_____

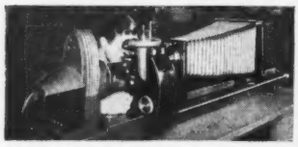
"I save money and do better work

by using only genuine PARKER-KALON Screws"

(Say thousands of users of Sheet Metal Screws)



4 Reasons Why YOU CAN DEPEND ON PARKER-KALON PRODUCTS



Unexcelled Laboratory Facilities . . . The Parker-Kalon Laboratory which controls and maintains the high standard of quality for which Parker-Kalon Screws are so widely recognized, represents an investment of over $250,000.

Specialized Production Equipment . . . (including the Parker-Kalon Hardening furnaces illustrated) is required to produce Parker-Kalon Self-tapping Screws and to maintain their uniformly high quality. The Parker-Kalon plant is famed as the most up-to-the-minute plant in the industry, with a capacity of 8,000,000 Screws per day.

Free Engineering Service . . . To assist designers and production men in obtaining better fastenings at lower cost, Parker-Kalon Assembly Engineers are available throughout the country. Their services are free to users of Parker-Kalon Self-tapping Screws as well as to those who wish to investigate the time-and-labor-saving possibilities of these Screws.

Available Everywhere . . . No matter where your plant is located there is a reputable supply house distributing Parker-Kalon Screws . . . assuring you of a dependable source of supply.

"PUT this fact down from one who has used Sheet Metal Screws for years:—"just as good" screws are poor substitutes for the genuine article. I learned from bitter experience that Parker-Kalon Sheet Metal Screws give me the best results on every job. No time wasted nor extra expense to remove and replace screws because the heads twisted off or the threads stripped . . . and P.K.'s drive so easily and hold so securely. That's why it's Parker-Kalon for me."

That, in a nutshell, is how practically the entire sheet metal industry feels about Parker-Kalon Quality. And why not? Back of every Parker-Kalon Screw are over 25 years of experience, modern equipment and methods, plus unexcelled laboratory resources . . . without duplicate in the industry. All help maintain the high standard of quality for which Parker-Kalon Sheet Metal Screws are so noteworthy.

PARKER-KALON CORPORATION, 200 VARICK ST., NEW YORK, N.Y.

Sold Only Through Recognized Distributors

PARKER-KALON *Sheet Metal Screws*

Twelve tons of galvanized ARMCO Ingot Iron PAINTGRIP sheets were used for ductwork in the Southern Bell Telephone Company building at Jackson, Mississippi. The beautiful paint job was done in quick-step time, pleasing the owners no end.

Here's a "Beauty Secret" THAT'LL EARN YOU MONEY

You too may have this "beauty secret" that's of real importance to every sheet metal contractor. It's simple: Galvanized ARMCO PAINTGRIP sheets take paint immediately and keep it protective and new-looking. There's no need for zinc-destroying acid-etching or weathering. And the paint really sticks!

The reason lies in PAINTGRIP's special bonderized finish. This gives the slick galvanized surface a finely granular phosphate coating that grips paint firmly. It also acts as an insulator between the zinc and the paint, thus preserving the essential oils that give paint its beauty and protective qualities.

Your customers will be glad to know about these unusual "owner-benefits." Tell them how PAINTGRIP helps produce smooth-looking, longer-lasting paint jobs — how it helps them save upkeep dollars. They'll go for it in a big way. As for yourself, you'll find that PAINTGRIP forms neatly and accurately and solders easily.

Galvanized ARMCO PAINTGRIP sheets can be had with a base of open hearth steel, copper-bearing steel or extra-durable ARMCO Ingot Iron. Order a supply from the nearby ARMCO Distributor. Ask him too about our free business-getting shop services. The American Rolling Mill Company, 1651 Curtis Street, Middletown, Ohio.

ARMCO

Armco PAINTGRIP

RYBOLT

WINTER AIR CONDITIONERS

The line with EVERYTHING your customer wants!

YOUR customer's primary interest in air conditioning is expressed in terms of what it will do for him—what it will give him in comfort, convenience, efficiency and economy.

Eye appeal also is an important factor because the heating equipment must contribute its part to the attractiveness of the modern basement or recreation room.

You can sell RYBOLT Air Conditioning readily on this basis because it will deliver efficient, dependable heating service at a cost which amply justifies its installation. Modern features of the most advanced type, including automatic control, filters that purify the heated air and humidifiers which provide proper moisture for health and comfort, are all embodied to insure complete customer satisfaction in the most severe or mildest weather.

With the complete Rybolt line you can easily establish your leadership in the air conditioning field in your territory. Write today for important information on how to increase your air conditioning sales.

RYBOLT SERIES 157

This RYBOLT Air Conditioning Unit illustrated above has as its heating element the well known Series 15 RYBOLT Cast Iron Coal-fired Furnace with its famous capacity for dependable performance. While not standard equipment, a fully automatic temperature control device can be added at slight extra cost.

SERIES 600A7
with the new Series 600 Steel RYBOLT Heating Element

THE RYBOLT HEATER COMPANY

615 MILLER STREET • ASHLAND, OHIO

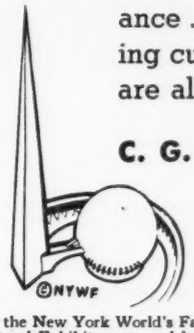
THE ENDURING COPPER

for every type of sheet metal job!

HUSSEY *Pure Lake* COPPER

Mined from the rich, natural copper fields of the Great Lakes . . . finished in the modern Hussey copper rolling mills in Pittsburgh . . . Hussey Copper Sheets have been preferred by sheet metal workers for more than 90 years for their superior quality, beauty and ductility.

That's why it will pay you to use and specify Hussey Copper for all permanent sheet metal construction. Maximum corrosion resistance . . . longer life . . . lasting customer satisfaction . . . are always assured.

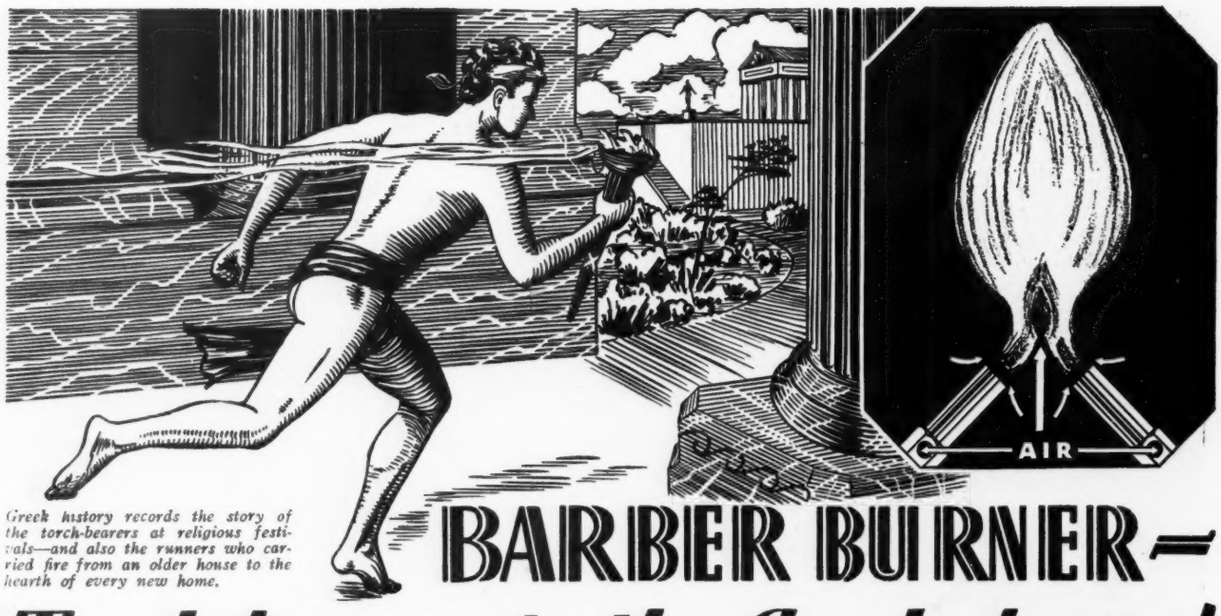


C. G. HUSSEY & COMPANY
(Division of Copper Range Co.)
Rolling Mills and General Offices:
PITTSBURGH, PA.

(All Hussey Warehouses now carry stocks of copper-armored SISALKRAFT in 1, 2, and 3 oz. weights.)

When you visit the New York World's Fair be sure to see the Educational Exhibit sponsored by the Copper and Brass Industry in the Metals Building.

Copper HUSSEY *Brass*



Greek history records the story of the torch-bearers at religious festivals—and also the runners who carried fire from an older house to the hearth of every new home.

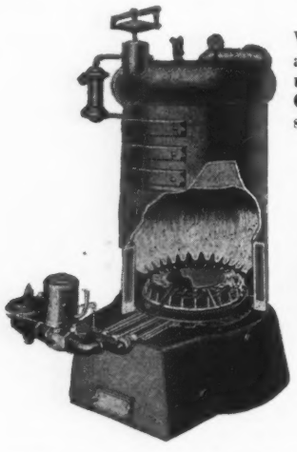
BARBER BURNER—

Torch-bearer to the Gas Industry!

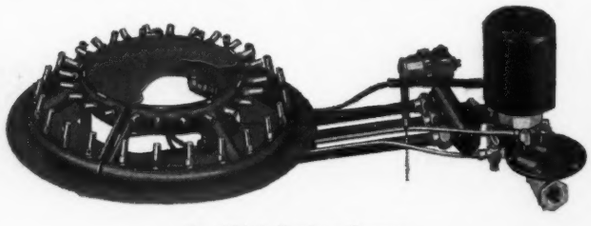
If today one were searching for "torch-bearers" in the *gas burner field*, he could not pass by the name of BARBER. Through scientific research and progressive design, Barber has carried the "flame" of efficiency to the doorstep of every builder of gas appliances.

A gas appliance is only as good as its burner. In 20 years' experimentation, Barber has developed its impinged jet principle to the highest flame temperature so far attained on atmospheric pressure—1900°. This represents almost the only advance in 25 years in basic methods of combustion, since virtually all other burners still employ the primitive "Venturia Tube" principle.

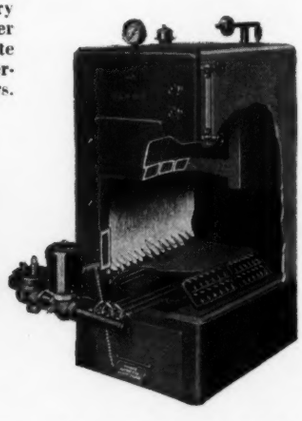
The burner is the heart of the appliance—determines its performance, its salability. Manufacturers of standard appliances to the number of 157 have adopted Barber Burners. Realization of this fact should prompt *dealers and buyers* to check up and see if *their* appliances are Barber-equipped.



We are gas burner specialists, and offer you freely our laboratory and engineering facilities on the design and manufacture of burner units appropriate for your specific purposes. Write for complete Catalog and Price List on Burner Units for Gas Appliances, Conversion Burners for Furnaces and Boilers and Gas Pressure Regulators.



No. 324-B Barber Burner



THE BARBER GAS BURNER CO., 3704 Superior Ave., Cleveland, Ohio

Address Michigan Inquiries to The Barber Gas Burner Co. of Michigan, 4475 Cass Ave., Detroit

BARBER BURNERS AND REGULATORS ARE DESIGNED FOR

Air Conditioning Equipment • High Pressure Boilers (Tubular and Tubeless) • Bakery Ovens • Doughnut Kettles • Metal Pots • Garage Heaters • Coffee Urns • Hair Dryers • Space Heaters • Floor Furnaces • Clothes Dryers • Water Heaters • Confectioners' Stoves • Vulcanizing Machines • Pressing Machine Boilers • Japanning Ovens • Core Ovens • Banana Room Heaters and many other Appliances.

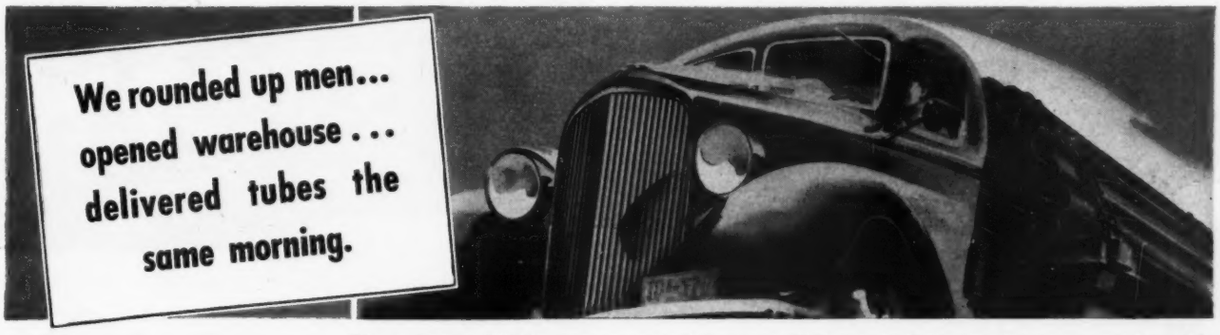
BARBER *Automatic* JET GAS BURNERS

FOR WARM AIR FURNACES, STEAM AND HOT WATER BOILERS

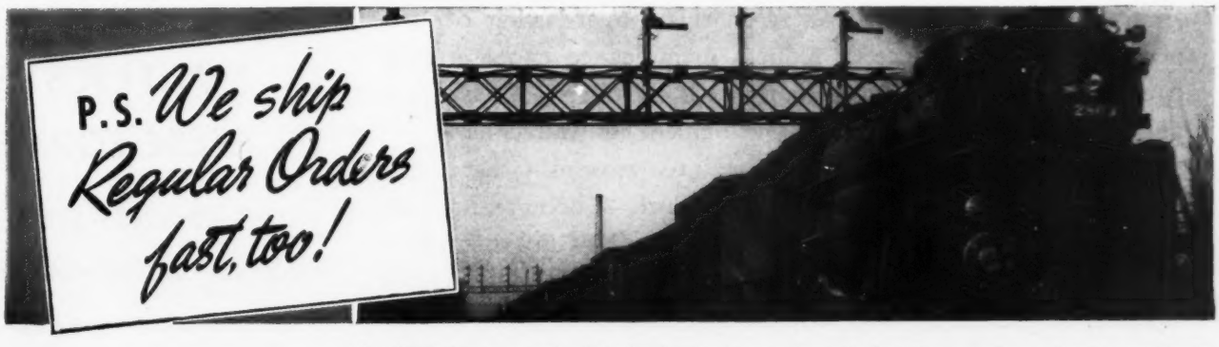
When you re-tube boilers . . .

remember Scully!

One Sunday morning the phone rang at the home of one of our Chicago men. A frantic customer was on the line—a boiler had broken down. Immediate repairs were imperative. Could we help?



We could and did. Men were sent to the warehouse and the necessary NATIONAL Seamless Boiler Tubes were delivered that same morning. This prompt action saved the owner expense and trouble.



But that's just a sample of Scully Service in an *emergency*. Regular orders always get quick action, too. For it is the rule at each of the eight Scully Warehouses to assume that our customers want prompt service always—no matter how large or small their order may be. And our customers have learned that they can *always* depend upon Scully for prompt, reliable, friendly service.

When you need boiler tubes—call Scully. And call Scully, too, for whatever you need in steel, steel products, copper and brass. Ask for the Scully Stock List and Reference book. It's free.

USS Scully Service

SCULLY STEEL PRODUCTS COMPANY

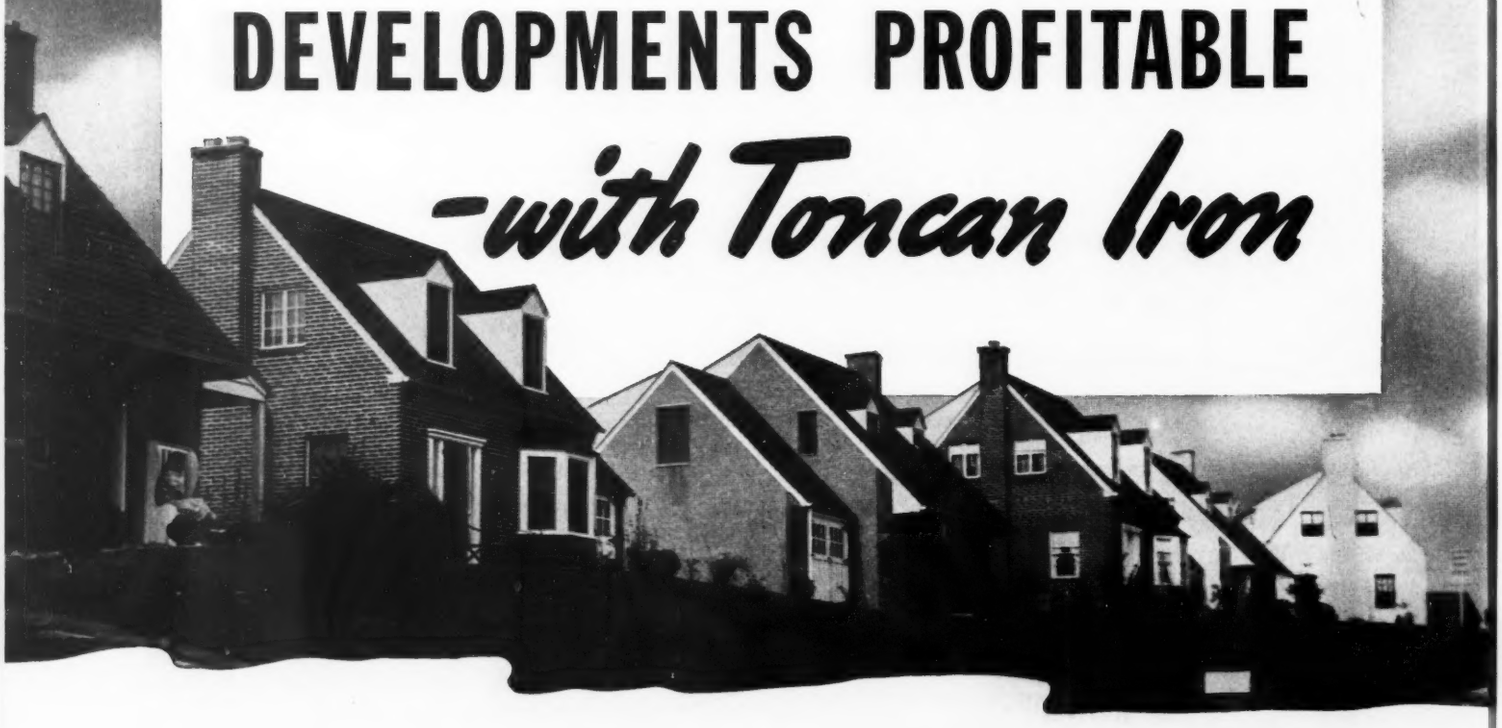
Distributors of Steel, Steel Products, Copper and Brass
Warehouses at

CHICAGO · NEWARK, N. J. · ST. LOUIS · BOSTON · ST. PAUL—MINNEAPOLIS
CLEVELAND · PITTSBURGH · BALTIMORE

UNITED STATES STEEL

YOU CAN MAKE HOME DEVELOPMENTS PROFITABLE

-with Toncan Iron



● Building reports indicate that home construction is showing increased activity. That means new opportunities for the sheet metal contractor to get business — and Toncan Iron can help.

Individual owners are interested in this longer-lasting copper-molybdenum-iron, because it reduces maintenance expense. Real estate developers use it, because it gives them an added selling argument, as in the Philadelphia development illustrated here.

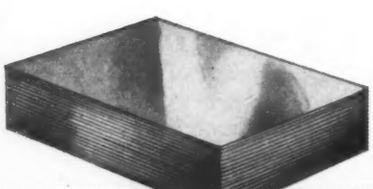
You should be interested in it for three reasons — because it builds your reputation for doing good work — because its well-known resistance to rust makes it easy to sell — and because it fabricates so easily and so uniformly that it actually reduces your shop costs on gutters, downspouts, flashing, ducts and furnace jackets.

If you can use additional arguments for Toncan Iron when selling the building owners and the contractor write for a copy of "The Path to Sheet Metal Permanence."

REG. U.S. PAT. OFF.
TONCAN
COPPER MO·LYB·DEN·UM
IRON

IS AVAILABLE IN THESE FORMS

SHEETS — PLATES — STRIP — ROOFING — SIDING — DRAINAGE PRODUCTS — BARS — PIPE — WIRE — WELDING ROD — BOLTS, NUTS, RIVETS



Other Republic Steel Products used by the sheet metal contractor include:

***ENDURO Stainless Steel — Steel Shingles — Steel Ceilings — Tin Plate — Nails — Taylor Roofing Ternes — Tubing — Shelving — Lockers — Bins.**

*Reg. U. S. Pat. Off.

REG. U. S. PAT. OFF.
REPUBLIC STEEL
CORPORATION
General Offices · Cleveland, Ohio

NILES STEEL PRODUCTS DIVISION · STEEL AND TUBES, INC.
UNION DRAWN STEEL DIVISION · TRUSCON STEEL COMPANY
BERGER MANUFACTURING DIVISION

TONCAN IRON

An alloy of refined open-hearth iron, copper and molybdenum
-that grows old slowly

AMERICAN ARTISAN

Volume 108 Number 9

Our Trust

SINCE 1932, when residential winter air conditioning first began to attract public notice, the warm air heating industry has had practically uncontested control of this far reaching comfort development. As the sponsor of winter air conditioning we, as an industry, have promised certain specific things. How well have we lived up to those promises? Perhaps right now, as we enter the coming heating season, is as good a time as any to take stock.

We have said that humidification is a very important function of winter air conditioning and that only with warm air, air conditioning can the home owner obtain *proper* humidity. Have we taken the trouble to explain what is *proper* humidity? By and large we have sidestepped the answer. We have let certain medical authorities, without adequate investigation, establish in the public mind that 40 per cent relative humidity is the healthful humidity condition. We know that in most houses 40 per cent relative humidity in zero weather is physically impossible without undesirable moisture condensation. There is considerable evidence that there is no single percentage of relative humidity which is *best* under all conditions of family health, winter climate, geographical location, but we have done nothing to explain this or to establish a variety of desirable conditions of temperature and moisture content.

We, as an industry, have welded winter air conditioning to air circulation. We have sold, too well maybe, the theory that changing the air within the house several times an hour is essential to comfort and health. We have even prepared codes which design systems on certain air changes per hour. But we have shut our eyes to the fact that all this propaganda *assumes* that the fan runs constantly whereas, in actual practice, fans seldom run more than a fraction of any given 24-hour period.

We know from experience that in many houses adequate air change is absolutely dependent on a low register air temperature or a varying register air temperature, but we have gone blithely on our way using some favored register air temperature which in some houses can't possibly deliver more than two air changes per hour. All our research has pointed to the fact that constant or near-constant air circulation is the only cure for cold floors, high ceiling temperatures, intermittent blasting of air into the room. But has the average contractor done anything about this problem?

We have laid much emphasis on the desirability of clean air. We have proved that only with warm air, air conditioning can cleaning be suitably incorporated. We have sold and installed filters to clean the air, but we have done little to make these filters function efficiently all through the heating season. We have been afraid to tell the owner that he has to buy new filters or clean the ones in use or buy a filter cleaning service. There are far too many contractors who never call back to see how their jobs are operating.

We have widely advertised our ability to provide uniform temperatures throughout any house. This can be done, in fact is easy to do, but in a large number of houses it can't be done with one thermostat. In spite of all the research which points to the need for zoning, we persist in riding our luck and trying to heat every house from one point of temperature control. Because zone operation costs a little more; because we seem to have a fear of trying any idea which is not grooved in our mind, we have let zone operation become a minor function instead of an established principle of winter air conditioning.

Much of the laxity in selling the fundamental principles of winter air conditioning can, of course, be laid on the doorstep of price competition. We all grant that when price enters the door quality flies out the window. In price competition there is no place for anything but bare essentials and in a method of heating as flexible as ours, bare essentials are apt to be pretty naked.

We have no one but ourselves to blame. We all—contractors, sales agencies, manufacturers—have been too greedy. We have let the buyers tell us what they will pay and we have cut quality to meet that price. We have made little effort—as an industry—to establish in the public mind the basic features of winter air conditioning and to explain to the public what apparatus and what engineering principles are necessary to insure these basic features.

The situation is not getting better. So far as we can see, it is rapidly getting worse. The only solution seems to be a concerted effort by manufacturers, national associations, state associations, local associations, contractor groups, and contractors individually to begin where we were in 1932 and re-establish in the public's mind the functions which make winter air conditioning, by warm air, desirable. We must also establish yard sticks by which the public can quickly measure any job offered.

Operating Mechanics of Cincinnati's Largest Furnace Cleaning and Service Organization

EARLY in 1937, Hugh Thompson and a group of his former associates with a nationally known heating company organized the Thompson Heating Corporation of Cincinnati, Ohio. While this is only their third year of operation, the firm has become known as one of the country's leading merchandising organizations in furnaces and heating service.

Mr. Thompson, President and active Manager, sets out the basic principles used in their operations as follows:

1. "An organization must justify its existence through intelligent and worthwhile service to its customers, always remembering that profits and unexcelled service are 'Siamese twins.'

2. "Any company desiring to grow must recognize ability, promote efficiency and reward the successful efforts of its help.

3. "Keep everyone in the organization "SALES AND SERVICE CONSCIOUS."

Most of the sales are derived from "old house prospects." The main artery through which their prospects flow is the vacuum cleaning department.

The active cleaning campaign starts early in the spring and continues until the fires are started. Their cleaning jobs run into the thousands and are solicited in several ways—telephone canvass, direct mail, door-to-door delivery of literature, but most effective of all is the house-to-house canvass.

The cleaning department is under the direct supervision of a department head who sees that each cleaning crew is routed in such manner that each crew gets to the jobs with the least possible delay. Customers are advised by phone or mail the date, and hour if possible, when to expect the cleaning crew.

The crew consists of two men equipped with two portable cleaning machines that are transported in cars owned and financed by the operators. On August 29 seven crews were operating, using almost exclusively Grand Rapids Cleaners.

The cleaning service consists of the operations as listed on the card here reproduced. When a job is cleaned, the owner is notified of the apparent condition of the heating system and a full report

Above and at the right—Two pictures of the field and management staffs of Thompson Heating Corp. How this large staff is coordinated and made to function efficiently is explained in the text.

FREE
Inspection
A Leaky Furnace
is a Menace to Health
Let us make sure
Your Furnace is SAFE!
RADIATOR
COMBUSTION CHAMBER
FIRE POT
ASH PIT
Is your furnace made of cast-iron sections cemented together? If so, be sure these joints are tight. Cement pulverized by constant expansion and contraction makes a cast-iron furnace leak dust and coal gas into the air you breathe. A burned-out or cracked section is equally dangerous. Take no chances with carbon monoxide poisoning. You can't see or feel or smell carbon monoxide gas. This poison strikes without warning. TAKE NO CHANCES.
We will inspect your furnace without charge. If the cemented joints are leaking, we will reset the furnace thoroughly and expertly — make your furnace safe again. If the furnace needs repairing, we are equipped to do this work at low cost.
We use special furnace cement that hardens like iron — and we completely fill every joint. Make your furnace clean and safe — and save money by having your furnace reset at the time we clean it.
IF YOUR FURNACE LEAKS AT ANY OF THESE POINTS
BEWARE
FURNACES RESET
Special Low Price

SAVE
ON FUEL BILLS
ON FURNACE REPAIRS
Let us Clean your Furnace NOW
Soot wastes a large part of your fuel every year. Soot is a better insulator than asbestos. Soot insulates the metal heating surfaces of your furnace or boiler — prevents heat from getting through to warm your home — wastes heat up the chimney. No one can afford the extra expense of firing a soot-coated furnace. Have your furnace cleaned — NOW!
Soot draws and holds moisture. Soot also contains some sulphur. Damp basement air unites with this sulphur to form sulphurous acid. This acid eats out your smoke pipe in short order — materially shortens the life of your furnace. No one can afford the high replacement costs that soot causes. Have your furnace cleaned — NOW!
NOW is the time to save money by having us clean your furnace. We specialize in furnace cleaning. Our operators are trained to do a thorough, expert job. Every square inch of surface is brushed and vacuum cleaned. All soot is removed. We will also vacuum clean all warm-air and cold-air pipes if desired. Phone now for details.
Special
LOW PRICE
on Furnace cleaning for a
LIMITED TIME ONLY
Thompson Heating

is made on the work order, listing parts or additional service needed. This report is then turned into the office each day. Three to five jobs constitute a crew's day's work.

The cleaning crew manager is expected to do the collecting for their services. To make it easy for him to collect, a statement of the job is attached to the cleaning order and he is instructed to leave it if they do not pay—this saves postage and hastens payment of the account.

The mechanics of operation of this department is the outgrowth of the trial and errors of many years experience selling and servicing equipment.

The Thompson organization places a high value on a customer's good will, be the job ever so troublesome or small.

The Indianapolis Furnace Company, which is owned by Thompson Heating Corporation, is also doing a very successful business. At present they have three crews on full time cleaning work.

THOMPSON HEATING CORP.,
Cincinnati, Ohio

Phones: Kirby 4111-4112

Attention Mr._____

You may enter my order for service checked below: (For limited time only.)

☐ **Complete Power-Suction Cleaning of Furnace** including Smoke Pipe, Registers, Flue Base, Hot and Cold Air Pipes. Tops of Pipes; Adjust Draft Chains; Paint Front of Furnace. **$3.95**

☐ **Power-Suction Cleaning of Furnace** (Not Including Registers and Pipes) Take Down and Hand-Clean Smoke Pipe and Base of Flue; Thoroughly Examine Furnace. **$2.45**

☐ **Clean Hot Water or Steam Boiler (Size governs price)**

Without obligation please send information on

☐ Recementing
☐ Furnace Repairs
☐ Improved Circulation
☐ New Furnace
☐ Air Conditioning
☐ Stoker
☐ Oil Heating
☐ Gas Heating
☐ Heating Service
☐ Automatic Control

Name_____

No. Street_____

City State_____

Phone Date Wanted_____

Address Where Work Is to Be Done

☛ FILL OUT AND MAIL AT ONCE — NO POSTAGE REQUIRED

Above—Two pages of a black and red, four-page, direct mail leaflet. The inside spread (not shown) features the different furnaces sold by the company. The page size is 11½ by 17 inches, newspaper stock.

◆

At left—Cleaning postal card (free return) showing the complete cleaning services offered. As the text explains, canvassing has proved the most effective method of obtaining cleaning orders.

Gravity and Mechanical Heating Code, With Licensing, of Columbus, Ohio

Contractors in Columbus, Ohio, have been working for many months to prepare and secure passage of an ordinance to license installers of gravity furnaces and winter air conditioning systems. The ordinance has now been passed and placed in force. We begin publication, here, of the ordinance. Future issues will carry the remainder of the code.

AN ORDINANCE NO. 174-39—To provide for licensing of those engaged in the installation, maintenance and repair of gravity warm air heating and winter air conditioning apparatus and for the inspection thereof, and for penalties for the violation of this ordinance.

Be it ordained by the council of the city of Columbus:

Section 1. Definitions. a. That the term "gravity warm air heating system" when used in this ordinance shall be construed to mean any and all warm air furnaces enclosed within a casing of any type and any and all appurtenances thereto or connections therewith intended to heat any building or enclosure by gravity circulation only wherein no mechanical force or equipment is applied, or which are governed by the codified ordinances of the city of Columbus of 1930, and amendments thereto:

b. That the term "winter air conditioning" when used in this ordinance shall be construed to mean heated, filtered and humidified circulated air automatically controlled and shall include any warm air appliances with ducts attached for the heating of any buildings or enclosure which may have attached thereto, in any manner, and made a part thereof, any type of fan or blower intended to stimulate or force circulation.

c. The term "industry" when used herein shall be construed to mean any person, persons, firm or corporation who contracts for, or undertakes to execute any work governed by this ordinance or who in the doing of such work seeks the services of or requires or permits the work of a journeyman, mechanic or laborer; but the occupying owner of a dwelling house may, with the assistance of any member of his immediate family and household personally carry on in such house any work governed by this ordinance without a license therefor, and shall not then be included in the definiton of "industry" provided that such owner shall take out a permit for any such work as hereinafter provided.

d. The term "journeyman," as used in this ordinance, means one who has learned the handicraft relating to the installation, maintenance and repair of equipment for which a license is hereinafter provided.

Section 2-a. That there be an inspector appointed by the director of public safety for the sole purpose of inspection of gravity and winter air conditioning. He shall give his entire time to the performance of the duties of his office, and shall not during his term of office be employed or engaged directly or indirectly, in any manner with any person, firm or corporation eligible for license as provided herein, or enter into any contract for work for others, covered by this ordinance, or for furnishing materials, plans or specifications for others.

b. Qualifications. Any such inspector shall have had not less than three years practical experience in engineering, planning and supervising or five years installing experience or winter air conditioning work, and shall be called "inspector of heating"; he shall be under the direction of the chief building inspector.

c. Duties. The duties of such inspector shall be to act as chairman of the examining board; to examine and approve when correct, all plans and specifications for the performance of any work governed by this ordinance, to see that they conform to the provisions of this ordinance and to point out in what respect such plans or specifications are defective or in violation of this ordinance; to inspect all work in the city of Columbus for which permits are required under this ordinance and to see that all such work is performed in accordance with the provisions hereof; to stop any work being done in violation of the terms hereof and to post "stop work" signs therefor; to order any such work removed or corrected to conform herewith, to issue certificates of approval on satisfactory completion of projects; provided, however, that no "stop work" order so posted shall affect work not governed by this ordinance except where the progress of any such work would interfere with inspection of work governed by this ordinance.

He and other building inspectors of this city shall have the right to enter upon any premises or into any

building or enclosure where he has reasonable cause to believe work is being or has been performed in violation of this ordinance for inspection of such work.

Section 3. Examining Board. a. There is hereby created a board of examiners of applicants for license to supervise or contract any installation or work governed by the provisions of this ordinance. Such board shall consist of the inspector of heating who shall be chairman of the board, and two license holders engaged in performing work in said city governed by this ordinance and two journeyman sheet metal workers engaged in said industry. The members of such board shall be appointed by the director of public safety, and shall each receive for their services the sum of five dollars for each and every meeting attended; provided, however, that such compensation shall never exceed the sum of twenty dollars for any month for any of said appointed members.

b. The terms of office of members of said board shall be as follows: One for a term ending July 1st, 1940, one for a term ending 1941, one for a term ending 1942, and one for a term ending 1943. Successors of such members of said board shall be appointed by the director of public safety for the term of four years, except that in the event an appointment is made to fill a vacancy on said board, such appointment shall be only for the unexpired term of the original appointment. Said board shall hold meetings at the city hall at least once in each calendar month of each year for the purpose of examining applicants for licenses as aforesaid, or renewing licenses and for the transaction of such other business as may properly come before it.

c. The duties of such board shall be to conduct written examinations of applicants for license to contract for and perform in such city, work and installations governed by this ordinance; and to inquire into the qualifications of such applicants.

Section 4. a. It shall be unlawful for any person, persons, firm or corporation to install, erect, alter, repair, reset or replace any warm air heating plant, plants, or part thereof, or winter air conditioning system or systems or parts thereof as defined in this ordinance within the corporate limits of the city of Columbus unless said person is the holder of a license then in force, issued by said city giving such person the right to perform or supervise such work, or unless said person, persons, firm or corporation has then in his, their or its employ a holder of such license then in force supervising such work. Such license shall be obtained by application therefor, to the inspector of heating, which application shall be accompanied by a fee of ten dollars; and by submitting to and passing the examination to be given such applicant by the examining board hereby created, said examination to be based upon the winter air conditioning and gravity heating codes of the city of Columbus in effect at the time of examination; provided, however, that the occupying owner of a dwelling house may with the assistance of any member of his immediate family and household personally carry on in such house any work governed by this ordinance without such license; provided that such owner shall take out a permit for any such work, as hereinafter provided. All moneys received for examination fees hereinabove provided for shall be deposited with the city treasurer and by him credited to the general fund of the city of Columbus.

b. Any applicant having fully complied with the provisions of paragraph (a) of this section and having successfully passed said examination shall upon recommendations of said board, signed by a majority thereof which record shall be filed with the building department, be issued a license to supervise and perform any installations and work in the branch or branches of the industry for which said applicant shall pass such examination, upon the payment of a license fee of twenty-five dollars to the auditor for the first year's license. Any such holder of any such license shall upon payment to the auditor of the fee of twenty-five dollars be issued a renewal thereof for the second and any subsequent year; provided, however, that on the failure of any such licensee to apply for and to pay for a renewal of said license on or before January 15th following the expiration of the previous year's license, such licensee shall forfeit such existing license and it shall be unlawful for any such person, persons, firm or corporation to perform any work governed by this ordinance until such time as a renewal license is issued. Any such license forfeited for non-payment of the renewal fee, may be reinstated upon the payment of the annual renewal fee plus one dollar for each month or portion of a month that such delinquency has continued; provided, however, that after such license has been delinquent and not in force for twelve months, then the same shall be absolutely null and void and may not be renewed; and the holder thereof shall be issued a new license only after full compliance with the provisions of paragraphs a. and b. of this section; provided, further, however, that any person who has been actually and actively engaged in either of the two branches of the industry hereinbefore described for a period of at least one year, shall be entitled to have issued a license, as herein provided, for one or more branches of the industry named herein in which he has been so engaged, on the payment within fifteen days after the taking effect of this ordinance of the fee of twenty-five dollars, without submitting to the examination provided for in paragraph a. of this section. The license herein provided for shall be issued only to an individual, and not to a corporation or firm; and such license shall not be transferable. It may be issued to cover work in any one or more of any of the following branches of the industry, to-wit:

(1) Gravity Warm Air Heating.

(2) Winter Air Conditioning Apparatus.

All moneys so collected shall be deposited by the city auditor with the treasurer of the city of Columbus and by him credited to the general fund of the city of Columbus. Such license, or the renewal thereof, shall be issued by the city auditor upon the certificate of the secretary of said board of examiners that the applicant is entitled thereto.

[To be continued]

Right — Faced entirely with metal, the Young Sheet Metal Specialty Co. store presents a shiny, attention-commanding appearance even on the gloomy day this picture was taken. The sheet metal shop is behind the store, with entrance through the store.

◆

Below — The neighborhood housewife has come to think of Theodore Boehm's store for any item made of metal, particularly cake, pie and bread tins, not to overlook funnels and the old-time growler.

Young Sheet Metal Specialty Co. Makes Profits From A Variety of Sales

By H. L. Burrill

THE Young Sheet Metal Specialty Company, 2220 West Vliet Street, Milwaukee, has found that embarking on a five-fold business program helps them level out their work and raises their income for the year. The business is spread over, (1) invention models; (2) specialty work; (3) a household novelty store in the front of the building; (4) the manufacture of household incinerators, and (5) the usual sheet metal work.

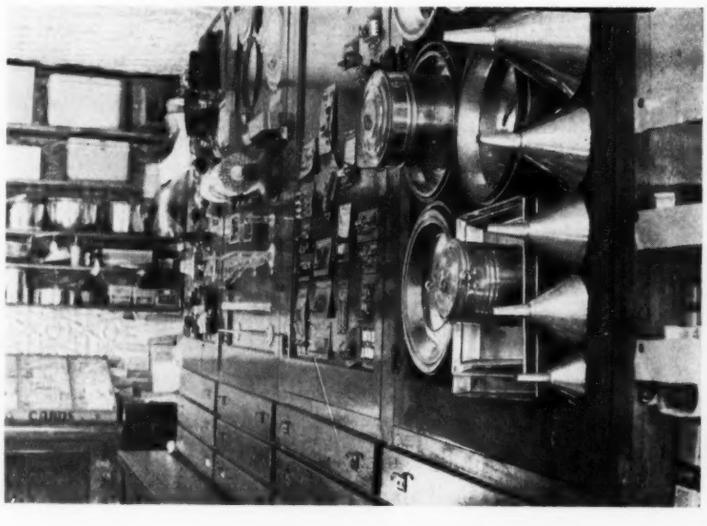
Some of the most interesting jobs done in the Young Sheet Metal shop are the invention models.

Inventors generally bring a rough drawing in to Mr. Theodore Boehm, the present owner of the shop and give him all the necessary dimensions. Mr. Boehm always talks over the model with the customer until he is sure he knows exactly what the customer wants. He then makes his patterns directly on the metal. He prefers this method to making a drawing to scale.

These invention jobs do not ordinarily lead to repeat orders. Usually a successful article is turned out in such quantities that die cutting is profitable. Each development job, therefore, must bring in its own profit. The work is figured on the basis of the time and material spent.

One model, a patented rake cleaner, lead to an order for 100. In this case the customer did his own marketing.

The business of this shop has increased 30 per cent for the first few months of this year compared to the corresponding months of the previous year. Mr. Boehm states this increase is due entirely to the special work done in the shop. The



invention models combined with the other specialty work make up about 50 per cent of the total sheet metal work done in the shop.

As with invention models, other specialty work comes into the shop without direct solicitation. This work consists mainly of making outside or unusual metal equipment. Quite a bit of repairing is done, too. Some recent jobs turned out in this line are: a large bed pan, an unusual holder to keep bottles of mother's milk refrigerated in transit, household register humidifiers, large baker's pans, clips for holding fire extinguishers, a fernery, large pails, and a portable metal smoke house. The metal smoke house was made to order for a neighboring butcher shop, and has proved so successful that two other butchers, seeing this one in use, have ordered them for their own shops.

Another steady customer of the sheet metal shop is a camera shop owner who does some experimental work. He orders stainless steel developing tanks and other equipment of his own design.

These special jobs come in every season and provide a steadying source of income for the shop.

Mr. Boehm believes in making every piece of work completely satisfactory to his customer. His careful craftsmanship is undoubtedly his best salesman, and accounts for the large number of people who trust their work to him.

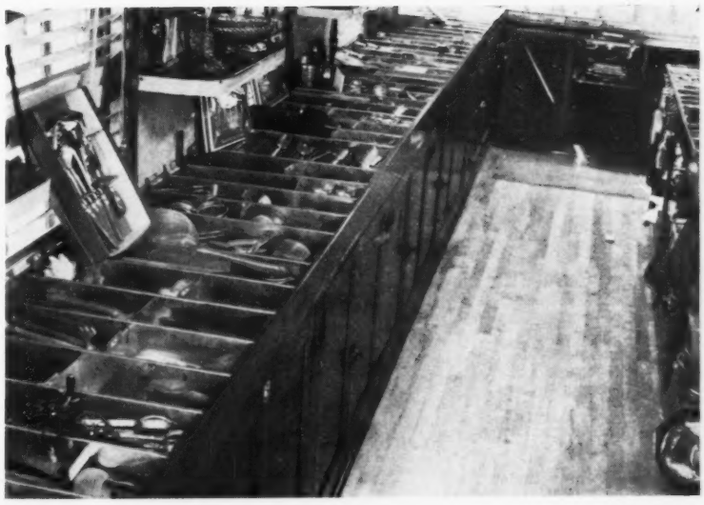
In December, 1936, when business and building were at a standstill all over the country, Mr. Boehm decided to open up a shop in the front of the building. He put in a stock of coffee pots, cake pans, garbage pails, hooks and other household necessities.

The store was a direct effort to reduce the overhead of the sheet metal shop. Some of the items are made in the shop itself, such as percolator handle protectors and clothes line hooks.

Three million of these percolator handle protectors have been sold since Mr. Boehm's grandfather patented the item in 1920. At that time the bottom

◆

A selection of greeting cards is a feature of the back wall. Cabinets and drawers provide storage for surplus stock.



From egg beaters to vegetable graters, they all have a place in the counter troughs at the Young Sheet Metal Specialty Co.

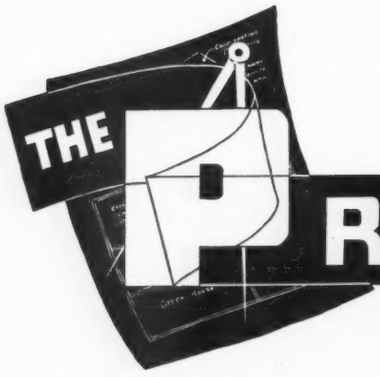
◆

support for percolators was made of wood. The handle protector was a piece of metal that hooked on the handle tightly and fitted below this wood support. It kept the wood from damage when the percolator was put on a stove to heat. The handle protectors were distributed nationally through small retail household stores.

The Boehm household store not only provides a convenient outlet for such sheet metal items, but also brings in some regular sheet metal business. When a customer wants an extra large pail or odd pan, she thinks of the Young Sheet Metal Specialty Company because she is used to trading there for her housewares. Trade also moves in the opposite direction. That is, sheet metal customers often pick out some household equipment from the store while they are ordering their sheet metal work. So each department of the business helps the other parts expand.

Besides these business levelers, the Young Sheet Metal Specialty Company manufactures three household incinerator models marketed under the trade name, "Kleenburn." Two of the models are fired by gas and the third by waste paper. They are sold in the store and through a distributor, the Koerner Incinerator Company. Mr. Boehm and his helper build up an inventory of these incinerators in any free time they may have so that they will not be caught short in a rush period.

The Young Sheet Metal Specialty Company was established in 1902 by three partners, one of whom was Mr. Boehm's grandfather. The high standard of their work throughout the past 37 years has given them a reputation for reliability. The firm enjoys the patronage of several large estates, contractors and building and loan brokers. A nearby hospital brings in such jobs as the recovering of zinc topped work tables and repairing of other equipment.



ROBLEM CORNER

Fuel Consumption and Furnace Capacity

American Artisan:

We have two questions relating to fuel consumption and furnace capacity with a forced air system. Assuming a system designed for —10 to 70 degrees; heat loss of 75,000 Btu per hour; heating value of coal 12,500 Btu per pound; combustion rate 7 pounds per hour per square foot of grate area; heating season about 200 days, how can we calculate fuel requirements? Secondly, using an underfeed stoker operating at 20 pounds of coal per hour, what should be the increase in furnace capacity with a fan system?

T. C. R., Canada.

Reply by
The Editors

We give two formulas commonly accepted for estimating fuel consumption. The first formula is sponsored by Elmer Torok, Member of the American Society of Heating and Ventilating Engineers:

$$\text{Fuel quantity per season} = \frac{H \times 24 \times D}{T \times F \times N \times E}$$

where H = the heat in Btu per hour required to heat the house in extreme weather
24 = the number of hours per day
D = number of degree-days per normal heating season
T = temperature difference maintained in extreme weather
F = heating value of fuel used, Btu per unit of fuel (lb. for coal; gal. for oil; cu. ft. for gas; kilowatt-hour for electricity)
N = number of units of fuel in the quantity desired (2,000 for coal; 1 for oil, gas and electricity)
E = efficiency of utilization, per cent.

To use this formula, you will note that we have to have a degree day reading for your territory, and we are using 7,000 deg. days, which is listed in the degree day handbook.

We are also using an efficiency rating of 65 per cent for a stoker-fired forced warm air system. Some engineers claim that the highest efficiency obtainable with a stoker is 55 per cent, but we believe that 65 per cent is a better rating where forced air is used and a good furnace with plenty of prime heating surface is employed. Substituting the figures of the formula, we have

$$= \frac{75{,}000 \times 24 \times 7{,}000}{80 \times 12{,}500 \times 2{,}000 \times .65}$$

$$= \frac{12{,}600{,}000{,}000}{1{,}300{,}000{,}000}$$

$$= 9.7 \text{ tons}$$

You will note that this works out at 9.7 tons of coal per heating season.

The ASH&VE GUIDE for 1937 gives the formula:

$$M = \frac{H\,(t - t_a)\,N}{t_d - t_o} \qquad (1)$$

Steam requirements are determined by dividing the above by 1,000, thus:

$$S = \frac{H\,(t - t_a)\,N}{(t_d - t_o)\,1{,}000} \qquad (2)$$

Fuel requirements may be determined by the following formula:

$$F = \frac{M}{C \times E} \qquad (3)$$

where t = inside temperature, degrees F.
t_d = inside design temperature, degrees F.
t_a = average outside temperature, degrees F.
t_o = outside design temperature, degrees F.
H = calculated heat loss of building based on outside temperature (t_o), Btu per hour
N = number of heating hours per season; 5,088 from October 1 to May 11.
M = heat loss, Btu per season
S = steam required to supply M Btu of heat loss
F = quantity of fuel required per heating season
C = calorific value of one unit of fuel, the unit being the same as that on which F is based
E = efficiency of utilization of the fuel, per cent.

Substituting again and using 32.6 as the average mean temperature for October to May for your area, we have the following mathematics:

$$M = \frac{75{,}000 \times (70 - 32.6)\ 5{,}088}{70 - (-10)}$$

$$= \frac{75{,}000 \times 37.4 \times 5{,}088}{80}$$

$$= \frac{14{,}271{,}840{,}000}{80}$$

$$= \frac{178{,}398{,}000}{.65 \times 12{,}500}$$

$$= \frac{178{,}398{,}000}{8{,}125},$$

$$= 21{,}956 \text{ lb. of coal} = 10.97 \text{ tons}$$

You will note this works out at 10.97 tons. The difference of approximately one ton may be accounted for by the fact that the ASH&VE formula uses an arbitrary 5,088 hours per heating season as compared to the 7,000 in the other formula and instead of using a degree day temperature uses a divisor of room temperatures to designed temperature, which probably changes the results considerably. We have no particular recommendations as to which formula you use, but we suggest that No. 1 is just a little bit easier to apply.

With reference to your second question, we do not like to suggest any arbitrary increase in capacity with a fan system, since there is not very much data available. The University of Illinois, in Bulletin 266, page 41, price $1.00, shows an increase in capacity from 65,000 to 105,000 Btu per hour at the bonnet at a three-pound combustion rate when fan is used in place of gravity. This has nothing

(*Continued on page* 108)

(2)

wing

(3)

tside

from

ss

eing

ean

ave

ce

he

38

he

a-

m-

y.

r-

bit

ke

an

ne

0,

tu

te

g

9

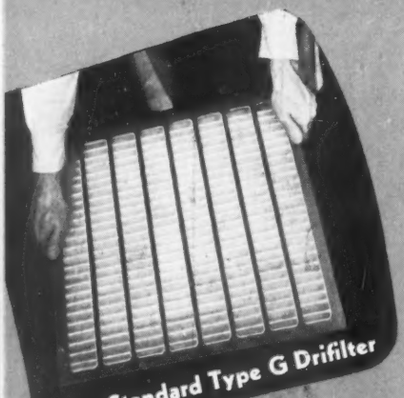
AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING

SECTION

DEVOTED TO HOME AND SMALL COMMERCIAL AIR CONDITIONING

Look at this graphic demonstration of how THE TYPE "G" *Drifilter* can "take it"!



The Standard Type G Drifilter

Glass fibre element unhurt.

Filter element springs back into place

No damage done.

THIS *LOW-COST* FILTER IS ALSO *CLEANABLE!*

LOW COST AND CLEANABLE is a rare combination in a filter as efficient in operation as the new Type G Drifilter.

The Type G filter may be cleaned several times before renewal is necessary by simply rapping out the dust accumulation. This makes active life in service as long or longer than other types of throw-away filters despite its much higher efficiency for dust removal.

ITS BONDED SPUN GLASS ELEMENT IS RESILIENT AND FLAMEPROOF

Deep crimping of the filter element increases the exposed filter surface of the Type G Drifilter to five times its frontal area, resulting in larger dust holding capacity and low resistance to air flow. Lightweight frame units in standard sizes are provided for jobs requiring an assembled filter installation.

ENGINEERING DATA

Normal Rated Capacity 600-800 C. F. M.

Cleaning Efficiency (Recirculated Air) 97%

Resistance at 800 C. F. M.

Filter Clean ..... .06" W. G.
With full Dust Load .25" W. G.

Standard Sizes 20x25x2" 20x20x2, 16x25x2, 16x20x2, 15x20x2, 10x20x2, and 10x10x2

Packed—6 to 12 to a Carton.

Shipping Weight, per carton of 6—12 lbs.

Write for Bulletin No. 297 for Complete Information

AMERICAN AIR FILTER CO., INC.
INCORPORATED
106 CENTRAL AVE., LOUISVILLE, KY. In Canada: Darling Bros., Ltd., Montreal, P. Q.

THE AMERICAN

TYPE "G" *Drifilter*

For Small Ventilating Systems

Frictional Resistance to the Flow of Air in Straight Ducts‡ [Part 2]

By F. C. Houghten*, J. B. Schmieler**, (MEMBERS), J. A. Zalovcik***, and N. Ivanovic†, Pittsburgh, Pa.

Part 1 of this article appeared in the July issue. This Part 2 is of interest because the tests reported draw a comparison between good and poor "tailor-made" ducts and fittings and between good "tailor-made" and "factory made" ducts and fittings. Sheet metal contractors will find in the test results several reasons why good, shop-made duct work is desirable.

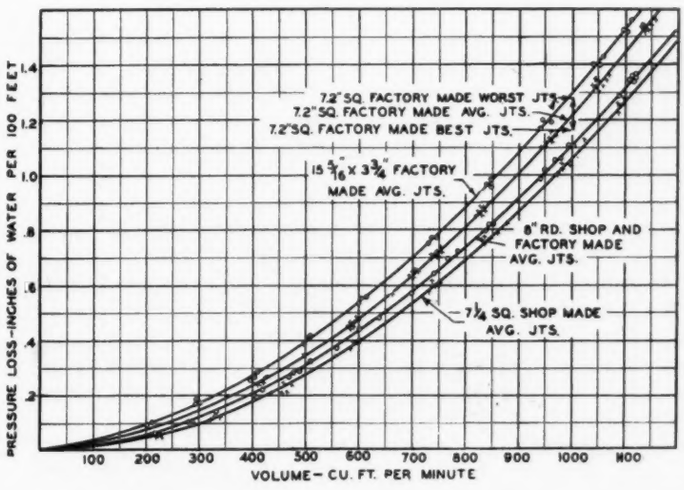

PRESSURE LOSS—INCHES OF WATER PER 100 FEET
VOLUME—CU. FT. PER MINUTE
7.2" SQ. FACTORY MADE WORST JTS.
7.2" SQ. FACTORY MADE AVG. JTS.
7.2" SQ. FACTORY MADE BEST JTS.
15 5/16 x 3 3/4" FACTORY MADE AVG. JTS.
8" RD. SHOP AND FACTORY MADE AVG. JTS.
7 1/4 SQ. SHOP MADE AVG. JTS.

Fig. 4—Relation between pressure loss and volume for 8-in. round and equivalent square and rectangular ducts with actual test points. The variation in the effect caused by the best and worst joints found for the factory-made 7.2-in. square duct is indicated by arrows. The 7¼-in. square shop-made duct had 12 joints per 100-ft length of run. All others 10 joints

Table 1—Characteristics of Ducts Studied

SHAPE OF DUCT	SIZE	MAKE	TYPE JOINT (A)	ACTUAL NO. OF JTS. PER 100 FT.
ROUND	4"	SHOP MADE	4	10
ROUND	4"	FACTORY	4	10
SQUARE	3½"	SHOP MADE	2 & 3 (B)	12
ROUND	8"	SHOP MADE	1	10
ROUND	8"	FACTORY	4	10
SQUARE	7¼"	SHOP MADE	2 & 3 (B)	12
SQUARE	7.2"	FACTORY	3	10
RECTANGULAR	15 5/16 x 3¾"	FACTORY	3	10
ROUND	24"	SHOP MADE	5	40
SQUARE	22"	SHOP MADE	2	25

A. See Fig. 3.

B. Each joint consisted of No. 2 on two opposite sides and No. 3 on the other two sides.

*Director, Research Laboratory, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

**Research Engr., Research Laboratory, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

***Research Asst., Research Laboratory, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

†Research Asst., Research Laboratory, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

Test Results

Results of a great many tests on different setups, including shop-made and factory-made round duct 8 in. in diameter, shop and factory-made square duct of approximately the same carrying capacity, and a factory-made rectangular duct of approximately the same carrying capacity are given in Fig. 4. Curves with test points are given for 7¼-in. square shop-made duct with average joints, 7.2-in. square factory-made duct with average joints, 8-in. round shop and factory-made duct with average joints, and 15 5/16 by 3¾-in. factory-made with average joints. The 8-in. round, and equivalent square and rectangular ducts were the first studied, and a great many tests were made while the effect of joints was being investigated. As a result, these ducts were erected and dismantled a number of times, which accounts for some of the dispersion of test points from the curves as drawn. Nevertheless, the points indicate a very definite curve in each instance. It will be noted that the several ducts as originally chosen did not have the same carrying capacity. The higher resistance shown by the factory-made, square and rectangular ducts was probably due to the relatively crude joints between sections, offering in some cases noticeable constrictions.

Reference to Table 1, which gives the characteristics of the different ducts studied, shows that the same joint distribution was not obtained for all the different ducts. Also, there will be apparent to individuals accustomed to duct design the fact that the length of duct between joints as tested does not in all cases represent common practice. This discrepancy, however, is corrected in later charts, where the resulting calculated relationship, between friction and flow, places all of the data on a more comparable basis. As pointed out previously, there was considerable difference in the uniformity in appearance of constrictions resulting from the joints in the different ducts. The 7.2-in. square factory-made and

‡Presented at the 45th Annual Meeting of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Pittsburgh, Pa., January, 1939. Reprinted by permission.

equivalent rectangular ducts showed the most variation in individual joints. The result of this variation on the resistance to flow through the joints of the 7.2-in. square factory-made duct is indicated by arrows on the curve for the duct in Fig. 4.

Curves similar to those in Fig. 4 were plotted for each of the three sizes of duct studied. However, since the length of section between joints did not represent usual practice in all cases, these are not presented, but, instead, there are included Figs. 5, 6 and 7, which give the calculated friction flow relationship for the number of joints per 100-ft length of run indicated in each case for the three sizes of duct tested. For this calculation the frictional resistance to the flow through a duct with no joints was determined by the pressure loss through a test section with no joint between static stations. The frictional resistance through the average joint is given by the formula:

$$J = \frac{h_w - C_o \times L}{N} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

where,

J = frictional resistance through the average joint in the test section

h_w = frictional resistance through the entire test section including straight run of duct and joints

C_o = frictional resistance per foot of duct without joints as defined previously

N = number of joints between static stations

L = total length of test section.

The frictional resistance for 100-ft length of the same duct with any other number of joints, N', then becomes $H_F = 100\ C_o + JN'$. The number of joints indicated for each size and type of duct is assumed to represent usual practice in each case. The curves mentioned show clearly the variations existing, when results based on common practice using present conversion formulae are plotted. Better results would be obtained if equivalent square and rectangular duct sizes had been calculated using the conversion formula as given later in the paper.

In order to present a better picture of the relation between friction and velocity of flow for the three sizes of round duct, these relationships are all plotted to the same scale in Fig. 8. The relation between the friction through the average joint for each duct and the velocity of flow is given in Fig. 9. The length of straight duct offering frictional resistance equal to that of a single joint in the duct should undoubtedly bear some definite relation to the velocity through the duct. Stated mathematically this equivalent length is defined as:

$$E = \frac{J}{H_f} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

where,

E = equivalent length of joint in feet of duct

J = average joint loss

H_f = static pressure loss per foot of duct without joints.

Sufficient data are not available to establish this relationship for all velocities. It is, however, given for a velocity of 2000 fpm in each duct. It will be noted that

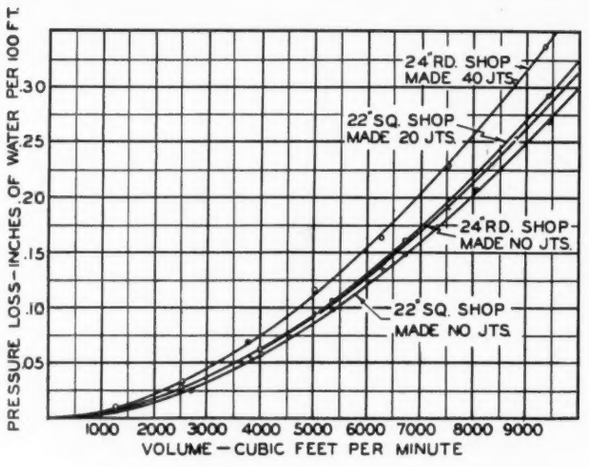


Fig. 5—Relation between pressure loss and volume for 24-in. round and equivalent square duct calculated from test data for 100-ft length of run with no joints and with the indicated number of joints

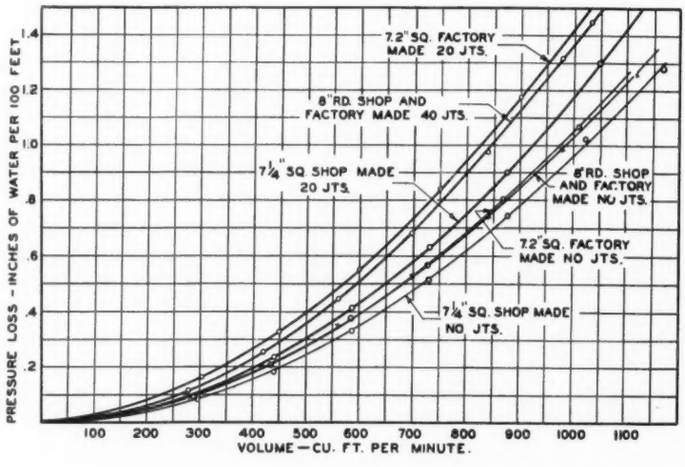

PRESSURE LOSS - INCHES OF WATER PER 100 FEET
1.4
1.2
1.0
.8
.6
.4
.2
7.2" SQ. FACTORY MADE 20 JTS.
8"RD. SHOP AND FACTORY MADE 40 JTS.
7¼" SQ. SHOP MADE 20 JTS.
8"RD. SHOP AND FACTORY MADE NO JTS.
7.2" SQ. FACTORY MADE NO JTS.
7¼" SQ. SHOP MADE NO JTS.
100 200 300 400 500 600 700 800 900 1000 1100
VOLUME - CU. FT. PER MINUTE.

Fig. 6—Relation between pressure loss and volume for 8-in. round and equivalent square duct calculated from test data for 100-ft length of run with no joints and with the indicated number of joints

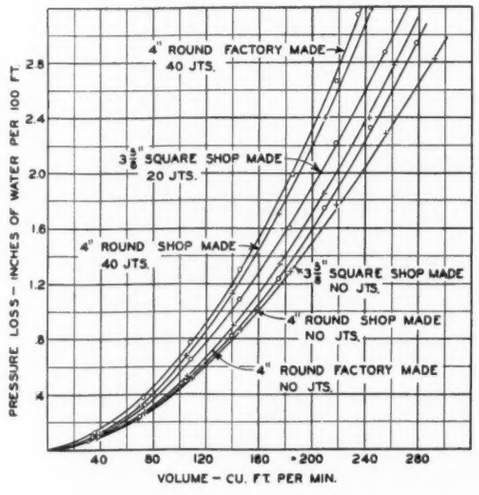

PRESSURE LOSS - INCHES OF WATER PER 100 FT.
2.8
2.4
2.0
1.6
1.2
.8
.4
4" ROUND FACTORY MADE 40 JTS.
3⅝" SQUARE SHOP MADE 20 JTS.
4" ROUND SHOP MADE 40 JTS.
3⅝" SQUARE SHOP MADE NO JTS.
4" ROUND SHOP MADE NO JTS.
4" ROUND FACTORY MADE NO JTS.
40 80 120 160 200 240 280
VOLUME - CU. FT. PER MIN.

Fig. 7—Relation between pressure loss and volume for 4-in. round and equivalent square duct calculated from test data for 100-ft length of run with no joints and with indicated number of joints

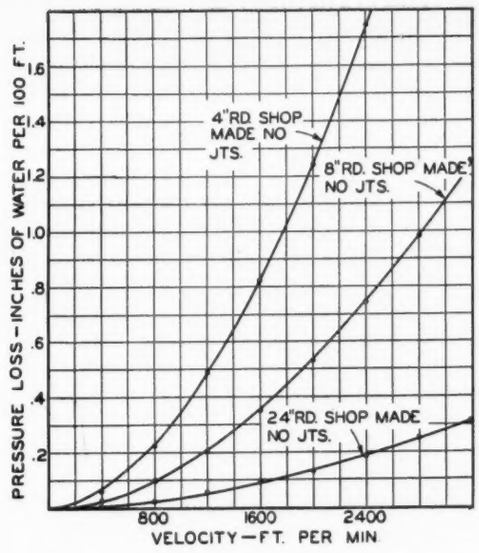


Fig. 8—Relation between pressure loss and velocity for 24-in., 8-in. and 4-in. round duct with no joints

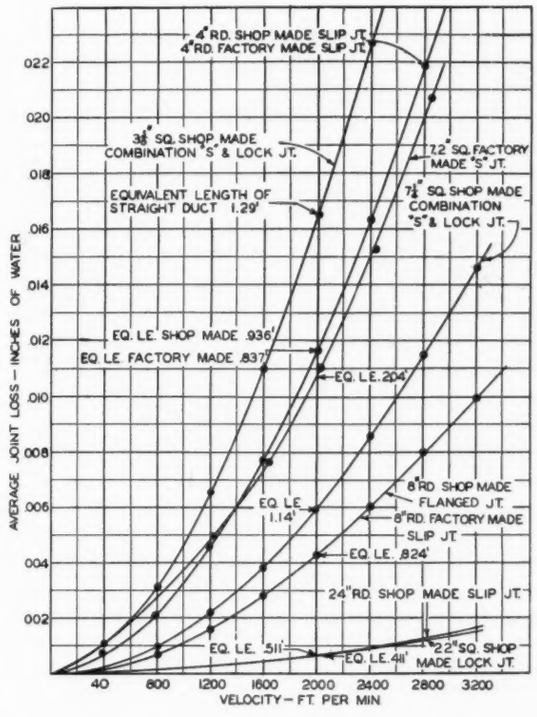


Fig. 9—Relation between average joint loss and velocity for all ducts tested

the 7.2-in. square factory-made joint gives a high friction compared to the other ducts of this equivalent size. The average joints in the different sizes offered resistance to flow at 2000 fpm equal to from a little under ½ ft of straight duct to a little over 2 ft. The high friction offered by the average joint in the 7.2-in. square factory-made duct accounts in part, at least, for the high resistance for this duct with average joints. This was in part due to the many tests made on this duct requiring the duct to be taken apart and reassembled a number of times.

Reynolds Number Relationship

The relation between the Reynolds Number and the pressure producing flow of any fluid, either liquid or gas, has been a great aid in developing a comprehensive understanding of the flow of such fluids. These relationships have their bearing not only on an understanding of the flow of fluids in pipe, but also on the flow of fluids under any other conditions, including convection currents set up near any heating or cooling surface and the effect of these convection currents on heat transfer. When applied to the flow of fluids in pipe, the Reynolds Number, defined as a dimensionless number, is expressed as:

$$R = \frac{DV\rho}{\mu} \qquad (7)$$

where,

R = the Reynolds Number
D = diameter of the pipe in feet
V = velocity in feet per second
ρ = density of the fluid in pounds per cubic foot
μ = absolute viscosity of the fluid in pounds per foot second.

Reynolds was able to show that for any pipe and any fluid, either liquid or gas, the flow was streamline when this dimensionless number had a small numerical value, usually below 2000 or 3000, while the flow generally became turbulent when the Reynolds Number exceeded this value. Streamline flow may exist for a Reynolds Number as high as 50,000 if care is taken to minimize the effects of initial disturbances. However, this represents an unstable condition and is seldom encountered in common practice and, for all practical purposes, turbulent flow generally exists for a Reynolds Number above 2000 to 3000. Air flowing under all practical conditions gives Reynolds Numbers above this critical value, indicating that the flow is always turbulent. To illustrate, standard air flowing in an 8-in. duct gives a Reynolds Number of 2500 when the velocity is 37 fpm.

It has been amply shown that, provided all the dimensionless characteristics of a pipe of a given material are similar and proportional, regardless of its diameter a single curve will express the relation between the friction factor and the Reynolds Number. The friction factor for this purpose is expressed by some authors as the reciprocal of the number of diameters length of the pipe necessary to cause a loss of one velocity head, while other investigators are accustomed to use friction factor values one-quarter smaller. The former is used in this paper but the resultant friction loss is identical in either case, since the difference in friction factor is accounted for in the respective friction loss formulae. To the extent to which this physical law is true, a single friction factor-Reynolds Number curve determined for any fluid flowing in any pipe should amply express the relationship for any other fluid flowing in this or any other pipe of the same type and material, regardless of size. The practical application of this theory in building up friction flow relationships for the flow of different liquids and gases in different types of pipe for practical use has caused a

great deal of misunderstanding. One simple requirement for the application of the theory is usually forgotten, namely, the provision that all dimensionless characteristics of the different sizes of pipe of the same material must be proportional; that is, as the diameter of the pipe changes, the roughness of the interior surface, the irregularities caused by joints, and presumably the length of sections between joints must all change in proportion to the diameter. In practice this requirement obviously never exists, and particularly is this true in the case of galvanized ducts of different sizes. The roughness of the interior of such a duct and the constriction and expansion effects at joints are practically constant regardless of the size of duct and, as a matter of fact, these irregularities may more often be greater rather than smaller in proportion to the diameter in small sizes of pipe. This is more particularly true in standard pipe. Certainly, however, in galvanized ducts the surface irregularities do not increase in proportion to the diameter; hence, a strict application of Reynolds Number should not be expected to apply.

In Fig. 10 the relation between the friction factor and the Reynolds Number, expressed in thousands, is plotted for the different sizes of round duct tested without joints and also with 40 joints per 100-ft length of run. It will be noted that for both the ducts without joints and with joints there is a consistent series of curves showing higher friction factors for the same Reynolds Number with decrease in diameter. This is as should be expected from a strict application of the Reynolds Number theory. Since the larger ducts have constrictions due to roughness, smaller in proportion to their diameter than is the case with the smaller duct, they should offer a lower friction factor index for the same Reynolds Number. It is also of interest to note the marked effect which joints in the duct have on these relationships.

For comparison, friction factor-Reynolds Number relationship curves are also included from the published results by Kemler[2] and by Bachmeteff.[3] The lack of agreement between the results of this study and the work of these investigators was the cause of a great deal of concern and extensive investigation during the early part of this study, until the importance of the proper proportion between diameter and other dimensions including roughness was taken into consideration.

The relation between the pressure loss and volume of air flowing for the three sizes of round duct without joints is plotted in Fig. 11 for the Laboratory data. Curves based upon the Friction Chart in the A.S.H.V.E. HEATING, VENTILATING, AIR CONDITIONING GUIDE, 1938 (page 566), are also included. In order to show agreement between test data for any size of duct and the calculated relationship based upon the modified Fanning formula, the predicted position of the curves for the 4- and 24-in. ducts, based upon the Laboratory data for the 8- in. duct and the formula,

$$H_F = \frac{0.765\, f\, L\, (V/4005)^{1.84}}{D^{1.26}} \qquad \text{.....(8)}$$

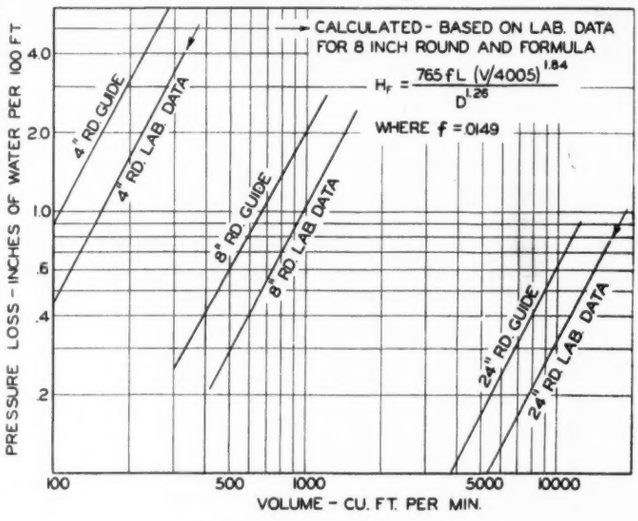


Fig. 11—Relation between pressure loss and volume for 1938 GUIDE data and the results of this study with no joints. Arrows indicate the location of curves for 4-in. and 24-in. round duct based on calculation using 8-in. round laboratory data and the formula given

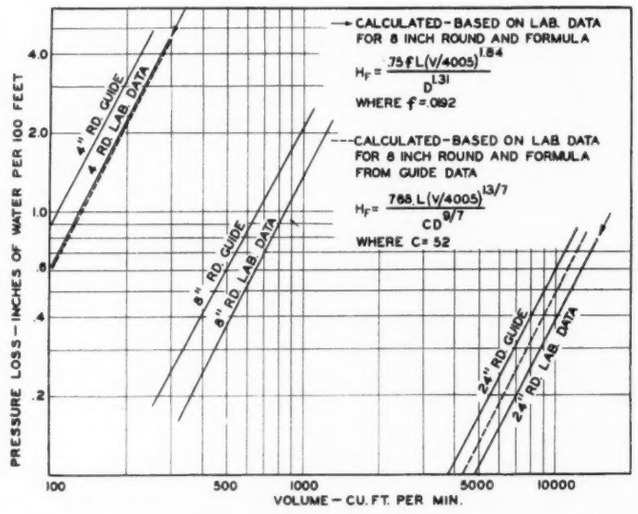


Fig. 12—Relation between pressure loss and volume for 1938 GUIDE data and the results of this study with 40 joints per 100-ft length of run. Arrows indicate the location of curves for 4-in. and 24-in. round duct based on calculation using 8-in. round laboratory data and the formula given. Broken line curves indicate the location of 4-in. and 24-in. round laboratory data curves resulting from formula given which applies to present GUIDE data

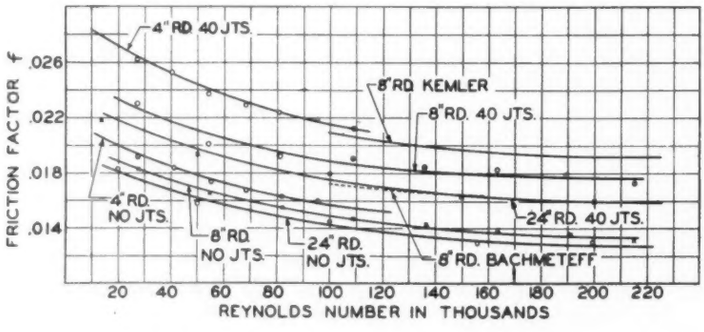


Fig. 10—Relation between the friction factor and Reynolds Number for the round ducts tested without joints and with 40 joints per 100-ft length of run. Curves for data published by Kemler[2] and Bachmeteff[3] are included

[2], [3]See Bibliography (2) and (3).

[2]See Bibliography (2).
[3]See Bibliography (3).

are indicated by arrows. It will be seen that a perfect check between the Laboratory data curves and the predicted location of the curves based upon calculation from the 8-in. curve results.

Similar relationships to those given in Fig. 11 are given in Fig. 12 for the three sizes of round duct with 40 average joints per 100-ft length of run. The arrows again indicate a perfect check between the curves based upon Laboratory tests on the 4- and 24-in. ducts and the calculated location based upon the 8-in. duct curve, and the formula:

$$H_F = \frac{0.75\, f\, L\, (V/4005)^{1.94}}{D^{1.31}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

It is of interest to point out that through the choice of proper exponents and constants in the formula, it would be expected that the calculated location of the arrow would agree with the curve based on test data for at least one of the 4- or the 24-in. duct. However, the fact that the calculation applies so accurately to both the smaller and the larger duct can only be accounted for by the application of a definite mathematical relationship for the different sizes of duct. This double agreement based upon calculation by a single formula should serve to lend confidence to the acceptance of the data on the three sizes of duct as a basis for expansion through this formula to smaller, intermediate and larger ducts. Certainly when this perfect agreement applies upon extrapolating from an 8-in. to a 24-in. duct, similar extrapolation up to ducts 4 or even 6 ft in diameter should be acceptable.

The broken line curves give the location of calculated curves for the 4- and 24-in. ducts based upon the Laboratory data for the 8-in. duct and the formula derived from the GUIDE data:

$$H_F = \frac{0.768\, f\, L\, (V/4005)^{1.9/7}}{D^{9/7}} \ldots (10)$$

It will be seen from this that, in order to extrapolate with confidence to intermediate and larger sizes of duct, it was not only necessary to establish an accurate curve for a given size of duct, but also to modify the constants and exponents in the formula by which the expansion was to be made.

Design Data

Based upon the formulae developed and used in connection with Figs. 11 and 12, the Laboratory data have been expanded into friction charts for a wide range of sizes of round duct without joints, and with 40 joints per 100-ft length of run, in Figs. 13 and 14, respectively. These charts are recommended for practical use. As pointed out a careful study of the relation between the number of joints per length of run as found in actual systems and as recommended by different authorities indicates an average arrangement of about one joint per every 2½ ft or 40 joints per 100-ft length of run. Based on the assumption that this frequency of joints will fit average design practice best, Fig. 14 is assumed to apply. However, in order to give the designing engineer an understanding of the effect of joints, as well as a basis

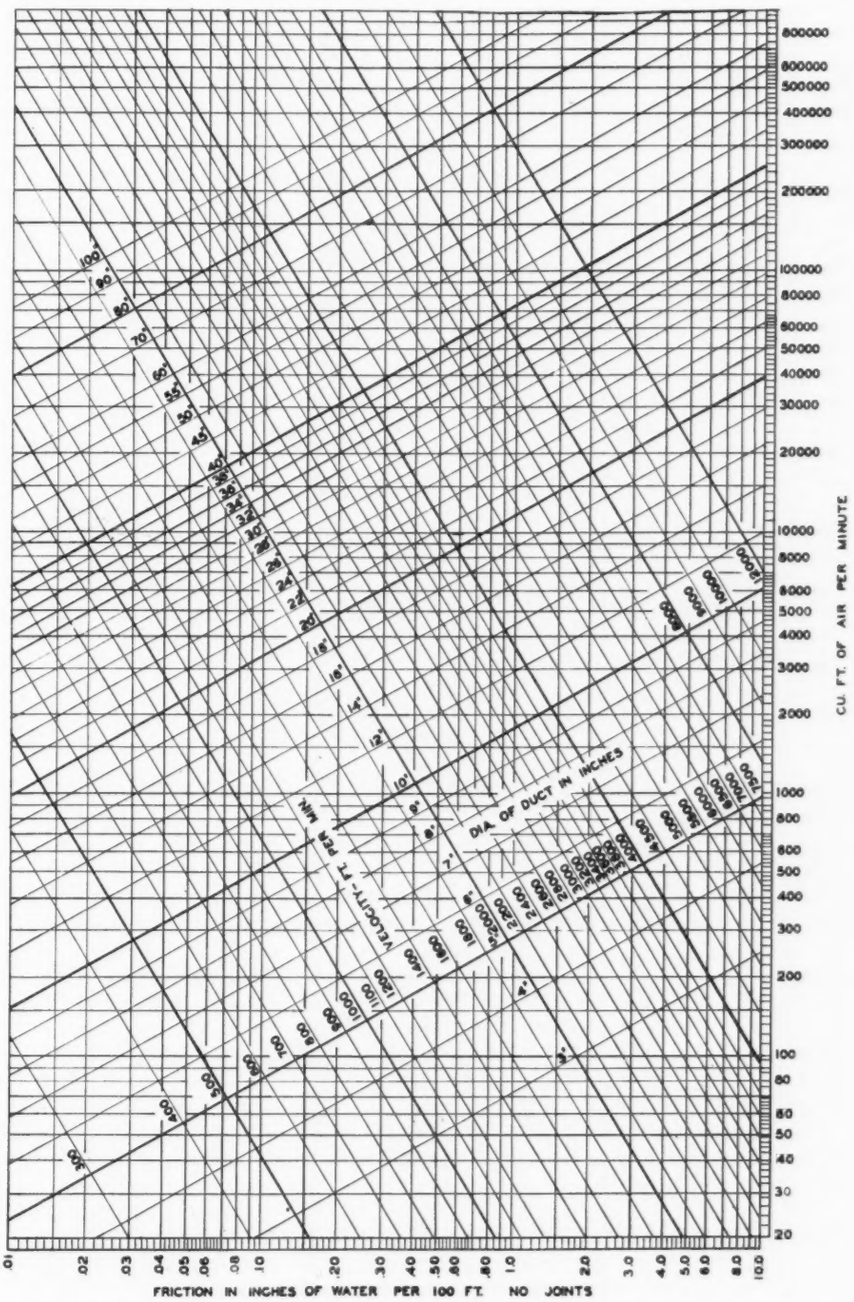


Fig. 13—Friction chart based on laboratory data for straight run of round duct without joints. No factor of safety allowed

great deal of misunderstanding. One simple requirement for the application of the theory is usually forgotten, namely, the provision that all dimensionless characteristics of the different sizes of pipe of the same material must be proportional; that is, as the diameter of the pipe changes, the roughness of the interior surface, the irregularities caused by joints, and presumably the length of sections between joints must all change in proportion to the diameter. In practice this requirement obviously never exists, and particularly is this true in the case of galvanized ducts of different sizes. The roughness of the interior of such a duct and the constriction and expansion effects at joints are practically constant regardless of the size of duct and, as a matter of fact, these irregularities may more often be greater rather than smaller in proportion to the diameter in small sizes of pipe. This is more particularly true in standard pipe. Certainly, however, in galvanized ducts the surface irregularities do not increase in proportion to the diameter; hence, a strict application of Reynolds Number should not be expected to apply.

In Fig. 10 the relation between the friction factor and the Reynolds Number, expressed in thousands, is plotted for the different sizes of round duct tested without joints and also with 40 joints per 100-ft length of run. It will be noted that for both the ducts without joints and with joints there is a consistent series of curves showing higher friction factors for the same Reynolds Number with decrease in diameter. This is as should be expected from a strict application of the Reynolds Number theory. Since the larger ducts have constrictions due to roughness, smaller in proportion to their diameter than is the case with the smaller duct, they should offer a lower friction factor index for the same Reynolds Number. It is also of interest to note the marked effect which joints in the duct have on these relationships.

For comparison, friction factor-Reynolds Number relationship curves are also included from the published results by Kemler[2] and by Bachmeteff.[3] The lack of agreement between the results of this study and the work of these investigators was the cause of a great deal of concern and extensive investigation during the early part of this study, until the importance of the proper proportion between diameter and other dimensions including roughness was taken into consideration.

The relation between the pressure loss and volume of air flowing for the three sizes of round duct without joints is plotted in Fig. 11 for the Laboratory data. Curves based upon the Friction Chart in the A.S.H.V.E. HEATING, VENTILATING, AIR CONDITIONING GUIDE, 1938 (page 566), are also included. In order to show agreement between test data for any size of duct and the calculated relationship based upon the modified Fanning formula, the predicted position of the curves for the 4- and 24-in. ducts, based upon the Laboratory data for the 8- in. duct and the formula,

$$H_r = \frac{0.765\, f\, L\, (V/4005)^{1.84}}{D^{1.26}} \qquad \text{.....(8)}$$

[2]See Bibliography (2).
[3]See Bibliography (3).

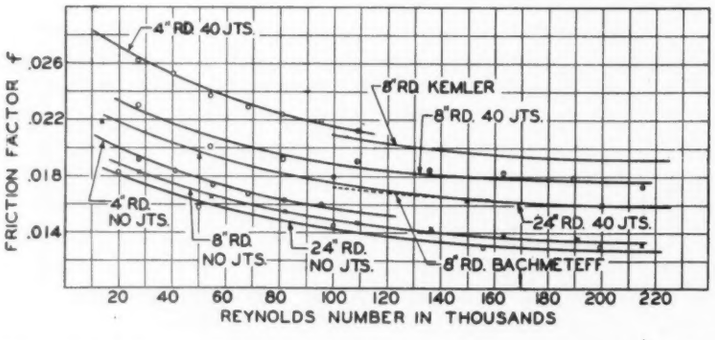


Fig. 10—Relation between the friction factor and Reynolds Number for the round ducts tested without joints and with 40 joints per 100-ft length of run. Curves for data published by Kemler[2] and Bachmeteff[3] are included

[2, 3]See Bibliography (2) and (3).

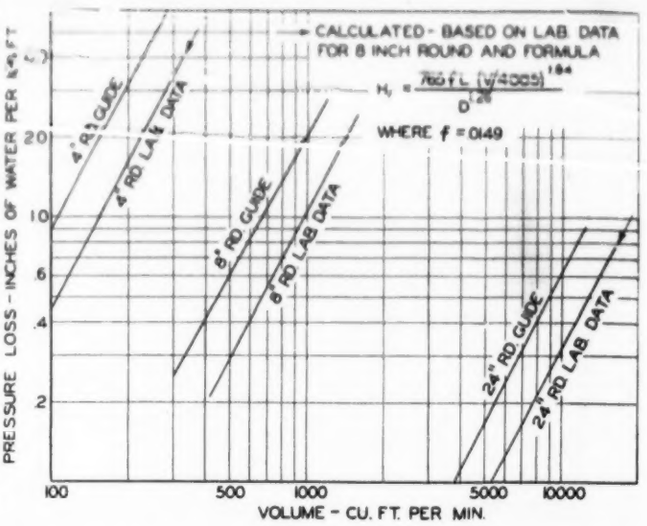


Fig. 11—Relation between pressure loss and volume for 1938 GUIDE data and the results of this study with no joints. Arrows indicate the location of curves for 4-in. and 24-in. round duct based on calculation using 8-in. round laboratory data and the formula given

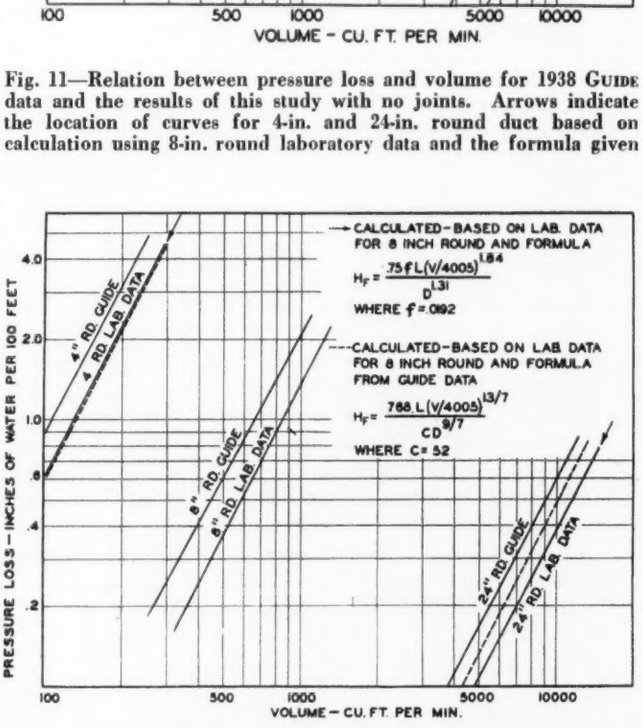


Fig. 12—Relation between pressure loss and volume for 1938 GUIDE data and the results of this study with 40 joints per 100-ft length of run. Arrows indicate the location of curves for 4-in. and 24-in. round duct based on calculation using 8-in. round laboratory data and the formula given. Broken line curves indicate the location of 4-in. and 24-in. round laboratory data curves resulting from formula given which applies to present GUIDE data

are indicated by arrows. It will be seen that a perfect check between the Laboratory data curves and the predicted location of the curves based upon calculation from the 8-in. curve results.

Similar relationships to those given in Fig. 11 are given in Fig. 12 for the three sizes of round duct with 40 average joints per 100-ft length of run. The arrows again indicate a perfect check between the curves based upon Laboratory tests on the 4- and 24-in. ducts and the calculated location based upon the 8-in. duct curve, and the formula:

$$H_F = \frac{0.75\, f\, L\, (V/4005)^{1.84}}{D^{1.21}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

It is of interest to point out that through the choice of proper exponents and constants in the formula, it would be expected that the calculated location of the arrow would agree with the curve based on test data for at least one of the 4- or the 24-in. duct. However, the fact that the calculation applies so accurately to both the smaller and the larger duct can only be accounted for by the application of a definite mathematical relationship for the different sizes of duct. This double agreement based upon calculation by a single formula should serve to lend confidence to the acceptance of the data on the three sizes of duct as a basis for expansion through this formula to smaller, intermediate and larger ducts. Certainly when this perfect agreement applies upon extrapolating from an 8-in. to a 24-in. duct, similar extrapolation up to ducts 4 or even 6 ft in diameter should be acceptable.

The broken line curves give the location of calculated curves for the 4- and 24-in. ducts based upon the Laboratory data for the 8-in. duct and the formula derived from the GUIDE data:

$$H_F = \frac{0.768\, f\, L\, (V/4005)^{1.9/7}}{D^{9/7}} \quad \ldots (10)$$

It will be seen from this that, in order to extrapolate with confidence to intermediate and larger sizes of duct, it was not only necessary to establish an accurate curve for a given size of duct, but also to modify the constants and exponents in the formula by which the expansion was to be made.

Design Data

Based upon the formulae developed and used in connection with Figs. 11 and 12, the Laboratory data have been expanded into friction charts for a wide range of sizes of round duct without joints, and with 40 joints per 100-ft length of run, in Figs. 13 and 14, respectively. These charts are recommended for practical use. As pointed out a careful study of the relation between the number of joints per length of run as found in actual systems and as recommended by different authorities indicates an average arrangement of about one joint per every 2½ ft or 40 joints per 100-ft length of run. Based on the assumption that this frequency of joints will fit average design practice best, Fig. 14 is assumed to apply. However, in order to give the designing engineer an understanding of the effect of joints, as well as a basis

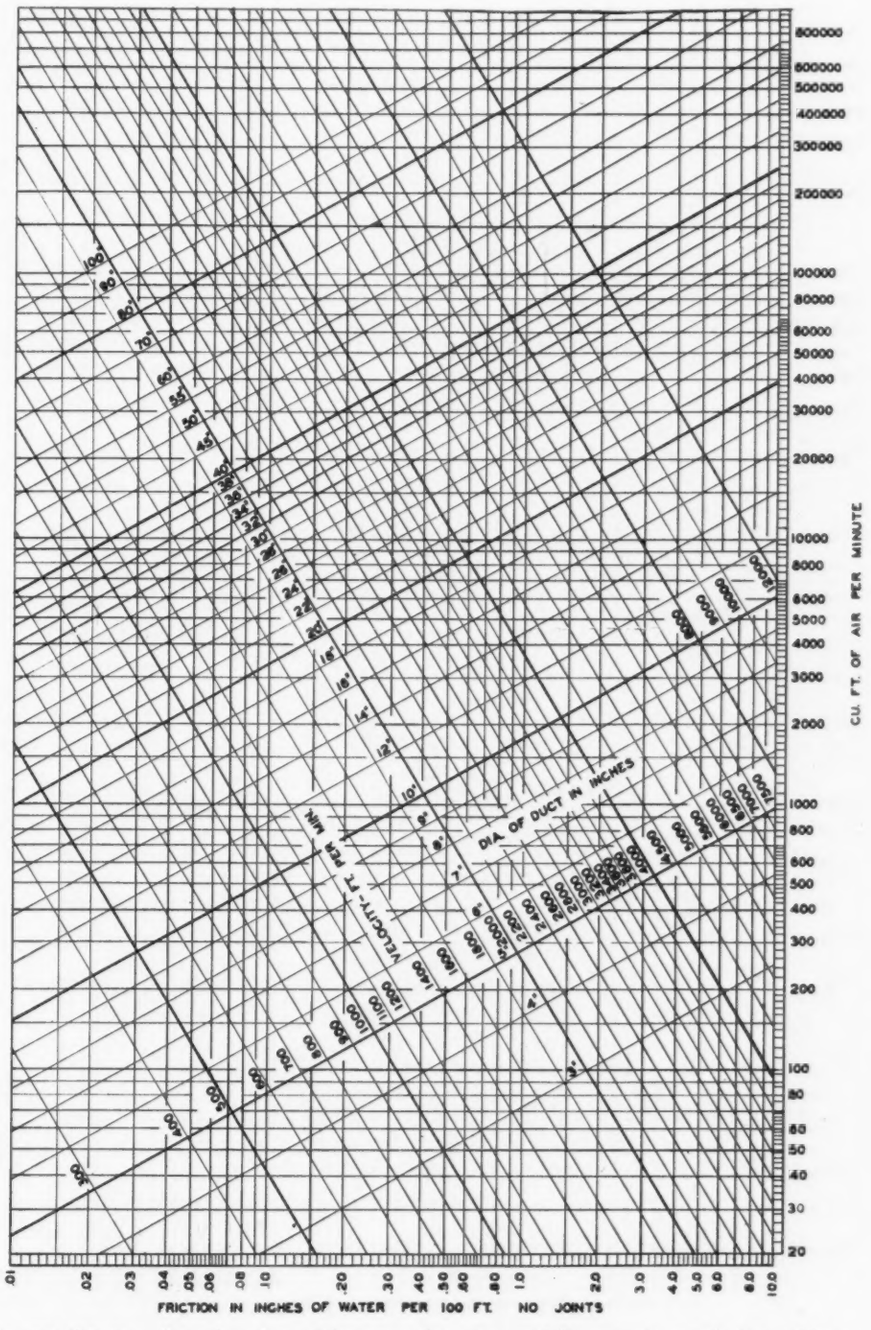


Fig. 13—Friction chart based on laboratory data for straight run of round duct without joints. No factor of safety allowed

on which a design for any other duct arrangement may be corrected, the friction chart for duct with no joints, Fig. 13, is also presented.

The original plans for the duct size study included a comprehensive study of rectangular ducts of various aspect ratios, in order to establish a basis for more accurate conversion from such rectangular ducts to equivalent round. The limitation of the study to square ducts, as carried out to date, with the one exception of rectangular duct, makes the development of a conversion relationship a little uncertain. However, based upon this limited study conversion data are offered in Table 2. The data are applicable with sufficient accuracy to convert from the square to round, and may, therefore, be assumed to apply without great error for other rectangular ducts. This phase of the subject should be investigated further.

Table 2 is a conversion chart giving the equivalent round pipe (same friction loss for same volume) for various rectangular ducts. For rectangular ducts it has been found that joints occur approximately every 5 ft, and for this reason the conversion chart is based on changing rectangular duct with 20 joints per 100 ft of run to round duct with 40 joints per 100 ft. A convenient formula, using the derived friction loss formula and the hydraulic diameter relationship, $D = 4A/P$,

where,

D = diameter in inches

A = cross-sectional area in square inches

P = wetted perimeter in inches,

is as follows:

$$D = 1.306 \sqrt[4.94]{\frac{(a\,b)^{3.10}}{(a+b)^{1.26}}} \quad \ldots\ldots (11)$$

where,

a = width of duct

b = height of duct.

Using this formula, the equivalent square duct for 4-in. round, 8-in. round and 24-in. round was calculated. This formula was found to be slightly in error when results from its application were compared with tests on the round and square ducts. The formula was therefore modified by changing the constant to give:

$$D = 1.32 \sqrt[4.94]{\frac{(a\,b)^{3.10}}{(a+b)^{1.26}}} \quad \ldots\ldots\ldots (12)$$

which holds true for ducts with no joints or equal number of joints. To convert rectangular ducts with 20 average joints per 100 ft of run to round duct with 40 average joints, the modified formula becomes

$$D = 1.35 \sqrt[4.94]{\frac{(a\,b)^{3.10}}{(a+b)^{1.26}}} \quad \ldots\ldots\ldots (13)$$

This formula was used in developing Table 2 which is to be used in conjunction with Fig. 13. For example, assume that the friction loss for a 16 × 14-in. duct at 2000 fpm air velocity is required. Referring to Table 2, a 16 × 14-in. duct is equivalent to a 17.1-in. round duct; referring to Fig. 13, at 2000 fpm in a 17.1-in. round duct, the loss is approximately 0.255 in. of water per 100 ft.

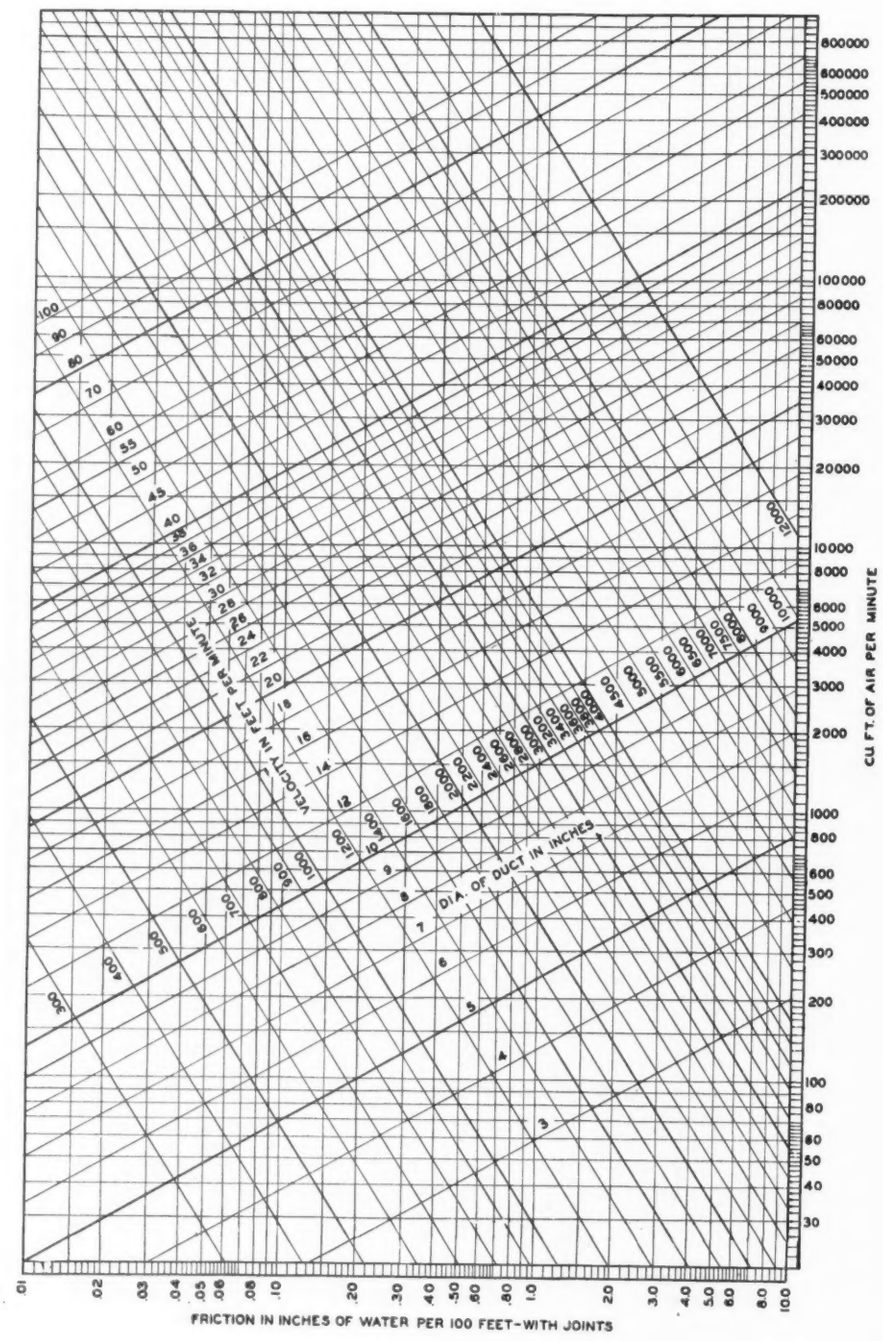

VELOCITY IN FEET PER MINUTE
DIA. OF DUCT IN INCHES
CU FT. OF AIR PER MINUTE
FRICTION IN INCHES OF WATER PER 100 FEET-WITH JOINTS

Fig. 14—Friction chart based on laboratory data for straight run of round duct with 40 joints per 100-ft length of run. No factor of safety allowed

Bibliography

1. Willard, A. C., A. P. Kratz and V. S. Day. A.S.H.V.E. JOURNAL, November 1921. Air Measurement in Furnace Testing.

Table 2—Circular Equivalents of Rectangular Ducts for Equal Friction and Capacity

Side Rectangular Duct—Inches	3	3¼	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24
6	4.7	4.9	5.5	6.1	6.7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
7	5.0	5.2	6.0	6.6	7.3	8.0	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
8	5.4	5.7	6.3	7.1	7.9	8.5	9.1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
9	5.7	6.0	6.7	7.5	8.3	9.0	9.6	10.2	....	....	....	....	....	....	....	....	....	....	....	....	....
10	5.8	6.2	7.0	7.9	8.7	9.5	10.1	10.8	11.4	....	....	....	....	....	....	....	....	....	....	....	....
11	6.2	6.5	7.3	8.3	9.1	9.9	10.6	11.2	11.9	12.5	....	....	....	....	....	....	....	....	....	....	....
12	6.4	6.8	7.6	8.6	9.5	10.3	11.1	11.8	12.5	13.0	13.6	....	....	....	....	....	....	....	....	....	....
13	6.7	7.0	7.8	8.9	9.9	10.7	11.5	12.2	13.0	13.6	14.2	14.8	....	....	....	....	....	....	....	....	....
14	6.9	7.2	8.1	9.2	10.2	11.1	12.0	12.7	13.4	14.1	14.8	15.4	16.0	....	....	....	....	....	....	....	....
15	7.1	7.4	8.4	9.5	10.5	11.4	12.3	13.1	13.9	14.5	15.2	15.9	16.5	17.1	....	....	....	....	....	....	....
16	7.4	7.6	8.6	9.7	10.8	11.8	12.7	13.5	14.3	15.0	15.7	16.4	17.1	17.7	18.1	....	....	....	....	....	....
17	7.5	7.8	8.8	10.0	11.1	12.1	13.1	13.9	14.7	15.5	16.3	17.0	17.6	18.0	18.8	19.3	....	....	....	....	....
18	7.7	8.0	9.0	10.2	11.5	12.5	13.5	14.3	15.1	15.9	16.7	17.4	18.1	18.8	19.4	20.0	20.5	....	....	....	....
19	7.9	8.1	9.2	10.5	11.7	12.7	13.7	14.6	15.5	16.3	17.1	17.9	18.5	19.2	19.8	20.3	20.8	21.2	....	....	....
20	8.0	8.3	9.4	10.7	12.0	13.0	14.0	15.0	15.9	16.7	17.5	18.3	19.0	19.7	20.4	21.0	21.6	22.1	22.7	....	....
22	8.3	8.7	9.7	11.1	12.4	13.4	14.4	15.6	16.6	17.5	18.3	19.1	19.9	20.6	21.3	22.0	22.7	23.3	23.8	24.9	....
24	8.6	9.0	10.1	11.5	12.9	14.1	15.2	16.2	17.2	18.1	18.9	19.8	20.5	21.4	22.1	22.9	23.6	24.3	25.0	26.2	27.3
26	8.9	9.3	10.4	11.9	13.3	14.6	15.6	16.8	17.9	18.8	19.8	20.7	21.5	22.3	23.1	23.9	24.6	25.3	25.9	27.2	28.4
28	9.2	9.5	10.8	12.3	13.8	15.1	16.3	17.4	18.5	19.3	20.3	21.2	22.2	23.0	23.8	24.6	25.4	26.0	26.8	28.1	29.4
30	9.4	9.7	11.2	12.7	14.2	15.5	16.7	17.9	19.0	20.0	20.9	21.9	22.8	23.7	24.5	25.4	26.1	26.9	27.7	29.2	30.5
32	9.7	10.1	11.5	13.1	14.6	15.9	17.1	18.3	19.6	20.7	21.6	22.5	23.5	24.4	25.3	26.2	27.0	27.9	28.6	30.1	31.6
34	10.0	10.3	11.8	13.2	14.9	16.3	17.7	18.9	20.0	21.1	22.1	23.1	24.0	25.0	25.9	26.8	27.6	28.5	29.4	30.9	32.4
36	10.1	10.6	12.0	13.7	15.3	16.8	18.0	19.4	20.6	21.8	22.8	24.0	25.0	26.0	27.0	27.9	28.7	29.6	30.3	32.0	33.5
38	10.3	10.8	12.3	14.0	15.5	17.0	18.5	19.8	21.0	22.1	23.3	24.4	25.4	26.4	27.5	28.4	29.4	30.3	31.1	32.7	34.2
40	10.5	11.0	12.5	14.1	15.9	17.5	18.9	20.2	21.6	22.8	24.0	25.1	26.2	27.2	28.1	29.1	30.3	30.9	31.8	33.4	34.9
42	10.7	11.3	12.8	14.5	16.3	17.7	19.3	20.6	22.0	23.3	24.4	25.5	26.6	27.7	28.7	29.7	30.7	31.6	32.5	34.2	35.9
44	10.9	11.4	13.0	14.8	16.5	18.1	19.7	21.1	22.4	23.6	24.9	26.0	27.1	28.2	29.3	30.2	31.2	32.1	33.0	34.8	36.5
46	11.1	11.6	13.2	15.1	16.8	18.5	19.9	21.5	22.8	24.2	25.4	26.7	27.9	29.0	30.1	31.2	32.3	33.1	34.0	35.8	37.4
48	11.2	11.8	13.4	15.3	17.1	18.8	20.4	21.8	23.2	24.5	25.9	27.1	28.3	29.4	30.6	31.7	32.7	33.7	34.6	36.4	38.1
50	11.5	12.0	13.6	15.6	17.5	19.2	20.7	22.2	23.6	25.0	26.3	27.6	28.9	30.0	31.1	32.3	33.3	34.3	35.2	37.0	38.7
52	11.6	12.2	13.8	15.8	17.8	19.5	21.0	22.6	23.9	25.5	26.7	28.0	29.2	30.5	31.6	32.8	33.9	34.8	35.9	37.8	39.7
54	11.8	12.4	14.0	16.1	18.0	19.7	21.4	22.9	24.3	25.8	27.3	28.5	29.7	30.9	32.1	33.2	34.2	35.3	36.3	38.3	40.3
56	12.0	12.6	14.3	16.3	18.2	20.0	21.6	23.4	24.9	26.2	27.6	29.0	30.3	31.6	32.9	34.0	35.1	36.2	37.2	39.2	41.1
58	12.1	12.7	14.4	16.6	18.4	20.1	22.0	23.6	25.2	26.4	28.1	29.5	30.9	32.1	33.3	34.5	35.6	36.7	37.5	39.7	41.6
60	12.3	12.9	14.6	16.8	18.7	20.3	22.4	23.8	25.5	27.0	28.6	30.0	31.4	32.6	33.9	35.1	36.2	37.4	38.4	40.6	42.6
62	12.4	13.0	14.9	17.2	19.2	20.8	22.8	24.4	25.9	27.3	28.8	30.2	31.5	32.8	34.0	35.2	36.3	37.5	38.5	40.8	42.9
64	12.5	13.1	15.1	17.3	19.3	21.2	22.9	24.6	26.2	27.7	29.1	30.5	31.8	33.1	34.3	35.5	36.7	37.8	38.9	41.0	43.1
66	12.7	13.4	15.3	17.6	19.6	21.5	23.3	25.0	26.6	28.1	29.6	30.9	32.3	33.6	34.8	36.1	37.3	38.4	39.6	41.9	43.9

Table 2—(Continued)

Side Rectangular Duct—Inches,	26	28	30	32	34	36	38	40	42	44	46	48
26	29.5	....	....	....	....	....	....	....	....	....	....	....
28	30.5	31.6	....	....	....	....	....	....	....	....	....	....
30	31.9	33.0	34.2	....	....	....	....	....	....	....	....	....
32	33.0	34.4	35.7	36.9	....	....	....	....	....	....	....	....
34	33.9	35.2	36.5	37.7	38.7	....	....	....	....	....	....	....
36	34.9	36.3	37.6	38.8	39.9	41.0	....	....	....	....	....	....
38	35.7	37.1	38.5	39.9	41.1	42.3	43.5	....	....	....	....	....
40	36.4	37.9	39.3	40.7	42.0	43.2	44.4	45.5	....	....	....	....
42	37.5	39.0	40.5	41.8	43.1	44.4	45.6	46.8	47.9	....	....	....
44	38.2	39.9	41.4	42.9	44.2	45.6	46.8	48.0	49.1	50.1	....	....
46	39.1	40.7	42.2	43.8	45.1	46.4	47.7	49.0	50.1	51.2	52.1	....
48	39.8	41.4	42.9	44.0	45.9	47.3	48.7	50.0	51.4	52.6	53.8	54.9
50	40.4	42.1	43.7	45.3	46.8	48.2	49.7	51.0	52.4	53.6	54.7	55.7
52	41.2	42.8	44.5	46.2	47.5	48.9	50.4	51.7	53.0	54.9	56.1	57.2
54	42.1	43.8	45.5	46.9	48.4	49.9	51.3	52.7	54.0	55.4	56.7	58.0
56	42.9	44.5	46.0	47.7	49.2	50.8	52.2	53.7	55.0	56.4	57.6	58.9
58	43.4	45.0	46.7	48.6	50.1	51.5	53.0	54.5	55.8	57.3	58.5	59.8
60	44.0	45.7	47.4	49.2	50.7	52.5	53.9	55.4	56.6	58.2	59.7	61.1
62	44.5	46.4	48.2	50.0	51.7	53.7	54.7	56.2	57.7	59.1	60.5	61.9
64	45.0	46.9	48.8	50.5	52.3	53.9	55.6	57.2	58.7	60.1	61.6	62.8
66	45.9	47.8	49.6	51.3	53.0	54.6	56.2	57.8	59.4	60.9	62.3	63.8
68	46.6	48.5	50.3	52.1	53.9	55.5	57.1	58.8	60.3	61.9	63.3	64.7
70	46.9	48.9	50.8	52.6	54.4	56.0	57.8	59.6	61.1	62.7	64.2	65.7
72	47.7	49.6	51.6	53.3	55.1	56.8	58.5	60.2	61.8	63.4	64.9	66.4

Side Rectangular Duct—Inches	50	54	60	66	72	78	84	88
50	56.7	....	....	....	....	....	....	....
52	58.1	....	....	....	....	....	....	....
54	59.3	61.7	....	....	....	....	....	....
56	60.0	62.4	....	....	....	....	....	....
58	61.9	64.1	....	....	....	....	....	....
60	62.4	65.0	68.2	....	....	....	....	....
62	63.2	65.5	69.4	....	....	....	....	....
64	64.0	66.8	70.6	....	....	....	....	....
66	65.2	67.9	71.5	75.1	....	....	....	....
68	66.1	68.8	72.6	76.7	....	....	....	....
70	67.1	69.9	73.6	77.6	....	....	....	....
72	67.8	70.6	74.5	78.6	81.8	....	....	....
74	68.8	71.5	75.6	80.2	83.3	....	....	....
76	69.8	72.6	76.8	80.6	84.3	....	....	....
78	70.4	73.4	77.7	81.7	85.3	88.5	....	....
80	71.3	74.4	78.7	82.6	86.2	89.7	....	....
82	72.2	75.3	79.6	83.5	87.2	90.8	....	....
84	73.0	75.8	80.1	84.3	88.4	92.1	95.5	....
86	73.7	76.8	81.3	85.6	89.5	93.3	96.8	....
88	74.6	77.8	82.3	86.6	90.5	94.3	97.9	100.2
90	75.3	78.3	82.9	87.2	91.3	95.1	98.9	101.2
92	76.2	79.4	84.0	88.4	92.4	96.4	100.1	103.0
94	77.1	80.2	84.8	89.1	93.3	97.3	101.1	103.5
96	77.7	80.9	85.7	90.1	94.3	98.4	102.2	104.5

2. Kemler, E. *Heating and Ventilating,* May 1936. The Flow of Air in Ducts.

3. Backmeteff, B. A. *Mechanical Engineering,* October 1936. The Reynolds Number.

4. Barnard, Ellenwood and Hirsfeld. *Heat Power Engineering—Part* 3.

5. Benjamin, M. W. *Heating, Piping and Air Conditioning,* February 1932. Calculation of Friction Loss in a Multiple Loop Header System.

6. Berestneff, A. A. *Heating, Piping and Air Conditioning,* March 1932. Total, Static and Velocity Pressure.

7. Blawnox Company Bulletin No. 14422, August 1933. Modern Methods of Measurement and Instruments for Measuring Velocities and Volumes of Air and Other Gases.

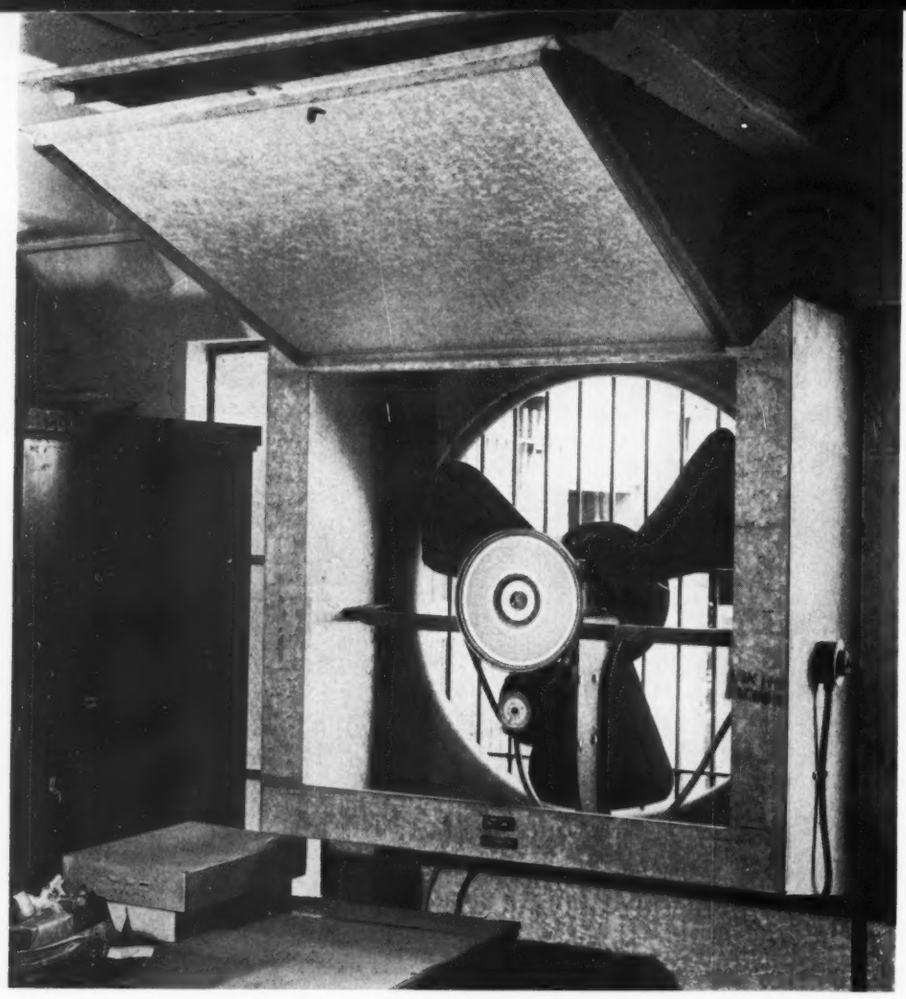
8. Brown, A. I. *Power Plant Engineering,* August 15, 1932. Friction of Air in Elbows.

9. Buffalo Forge Company. *Fan Engineering.*

10. Busey, F. L. A.S.H.V.E. Transactions, Vol. 19, 1913. Loss of Pressure Due to Elbows in the Transmission of Air Through Pipes or Ducts.

11. Cox, A. B. *Journal of Franklin Institute,* 1924. A New Theory of Fluid Flow.

(*Continued on Page* 112)



Attic Fans in Multi-story Buildings

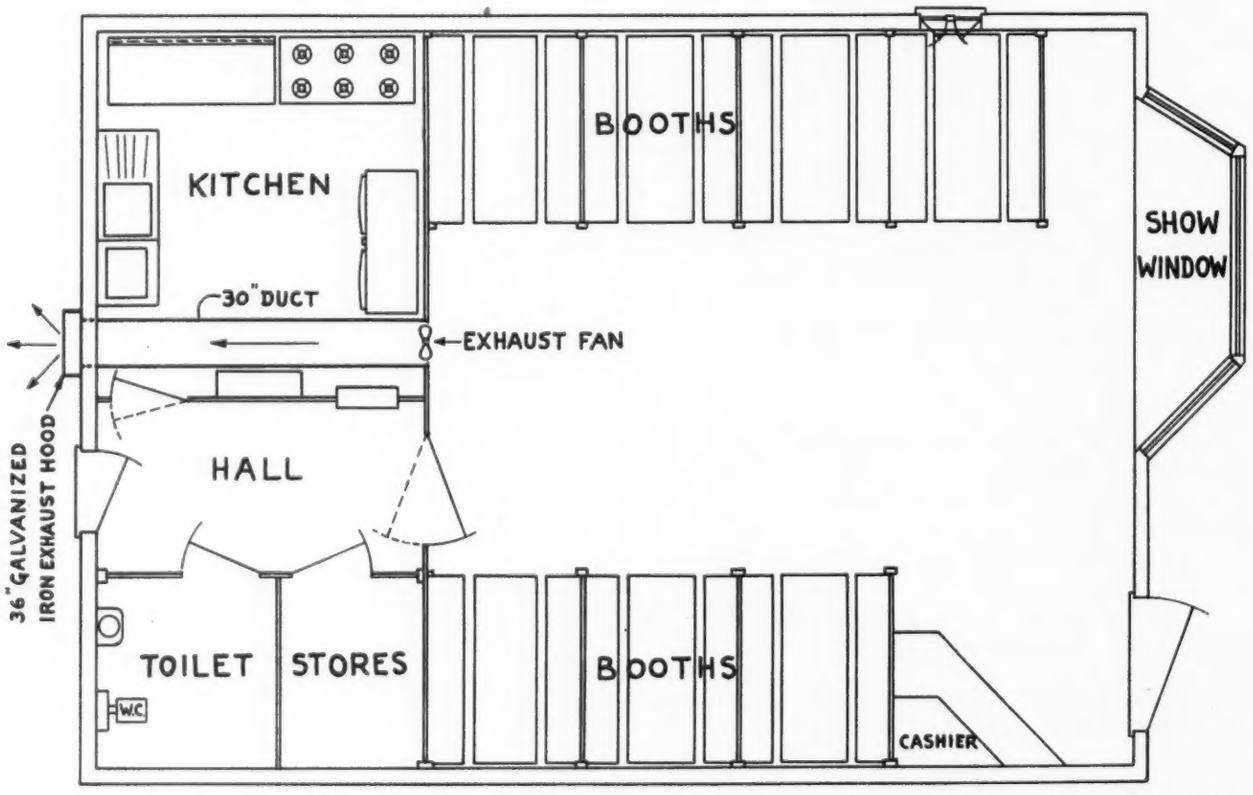
By Lawrence E. Gichner
Gichner, Inc., Washington, D. C.

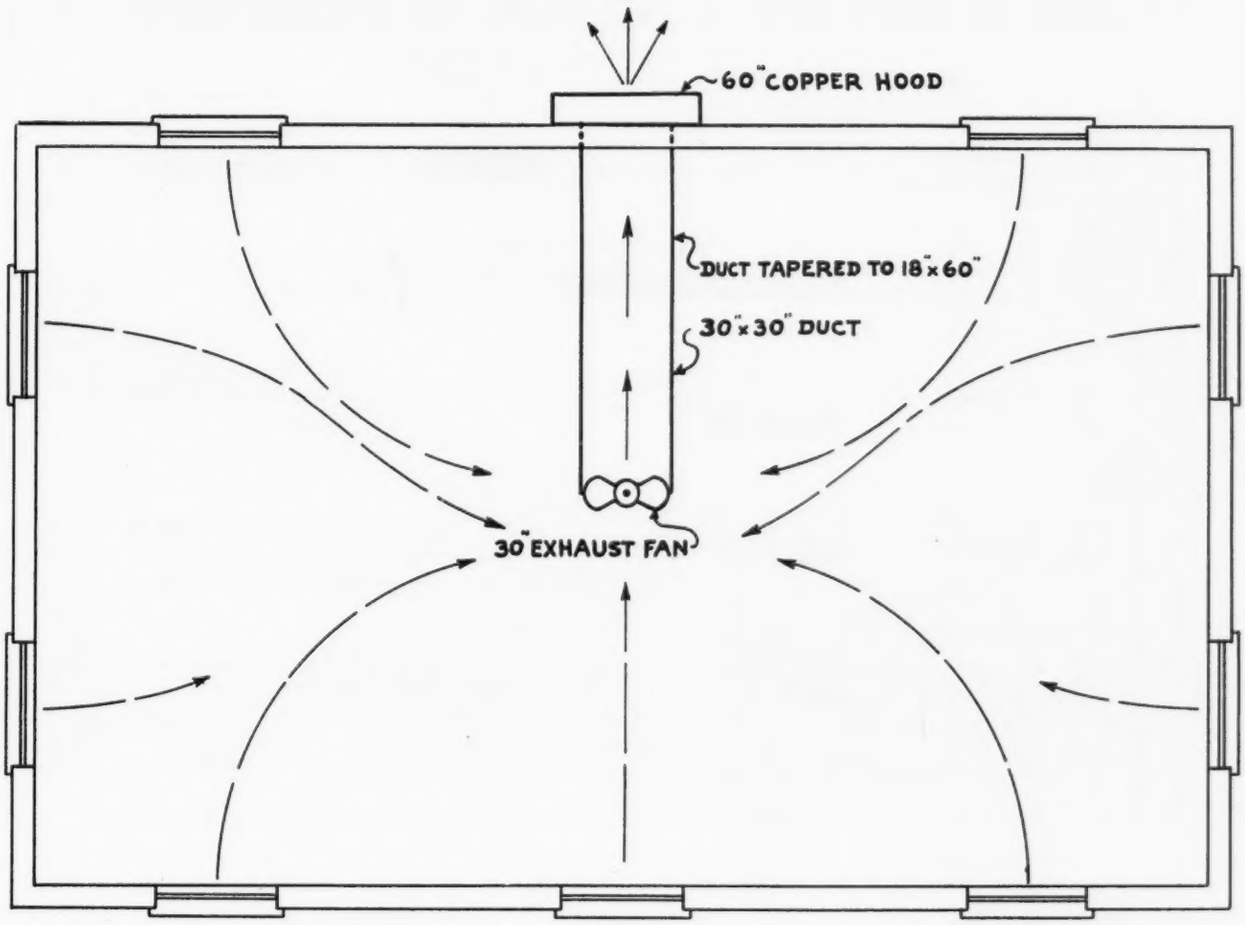
THERE are two solutions to the problem of ventilating the lower floors of a tall structure with belt driven fans. One method is to insert the fan in a wall or window. The other method is to use a duct system.

In erecting a fan in a wall or window in the usual manner, louvers have been necessary. Louvers are excellent in many situations, but in a room where people are working, they present two problems.

1. They eliminate light.
2. They allow heat to escape in the winter.

Finding a number of prospects for such installa-





The sketch above and the one on the facing page show two typical multi-story ventilating installations where the fan is placed near the center of the room to secure even "pull" from all corners of the space vented. The air from the fan is conducted outdoors by a square to rectangular duct line having a cross-sectional area approximately 25 per cent greater than the free area of the fan in order to reduce resistance and keep velocities low.

tions and desiring to eliminate these two drawbacks, we developed a unique housing that at once solves these problems. We mount the fan in the wall or window and then build a metal housing around it with a door in the back that can be easily opened and hooked. Where the fan is mounted high we use a pulley and string to open the door. (See photographs.)

Where light is desired it is possible to purchase large sheets of material similar to mica which can be installed both in the door and sides of the housing to allow light to enter the room. The face of the fan, of course, is open to the elements, so to eliminate rain that may drive into the housing, the bottom of the structure is built on a slant tilting to the front with weep holes.

We have made a number of installations that were successful with this type of arrangement. The fan is mounted on a panel and the panel, in turn, is attached to the upper part of the window jam. We take the precaution not to nail or screw the frame into the window slides or to impare movement of the windows. With this application the windows can be open or shut whether the fan is in operation or not. Sometimes we simply mount a hood on the outside of the fan to provide protection from rain.

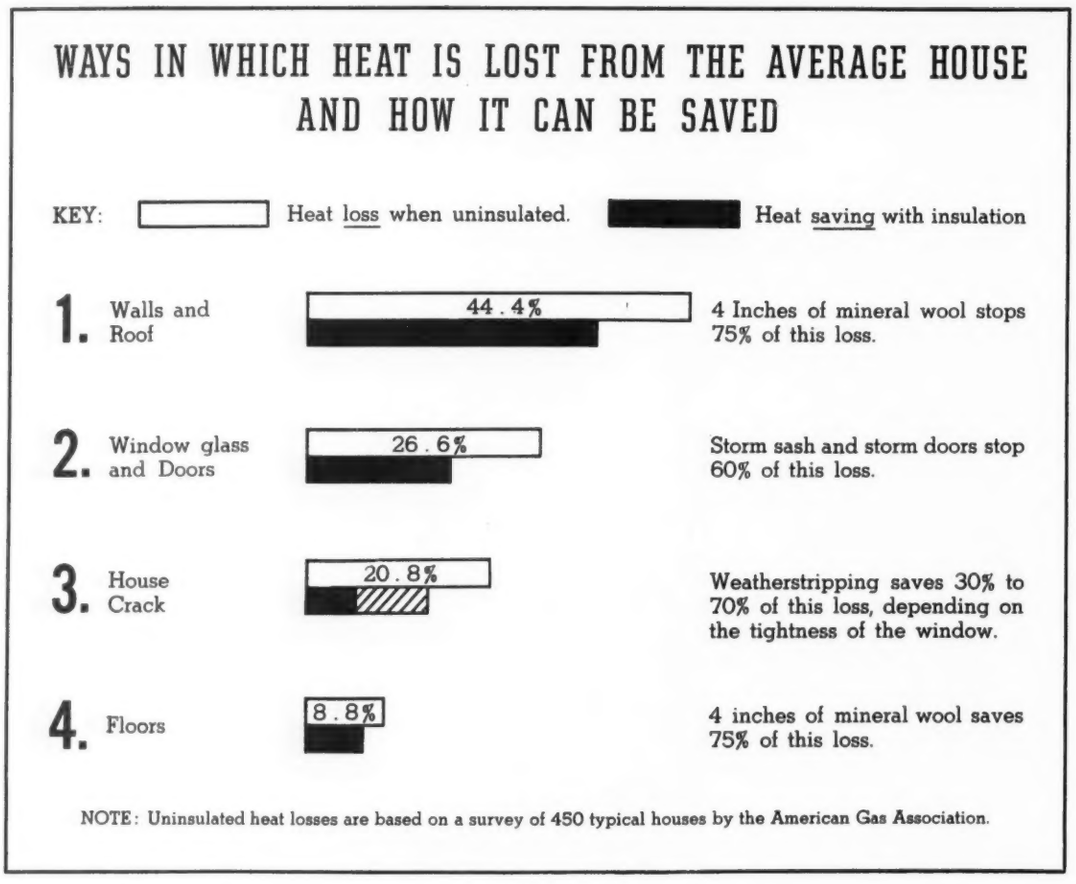
The duct systems mentioned are used where it is impractical to mount the fan in the window because of short circuiting air flow from nearby openings. In such installation we put the fan in the center of the room with a duct line running to the outside wall. (See sketches.)

Because it is necessary to use a fan of large capacity in many cases at least a 36 inch diameter, the duct tapers to a rather flat rectangle to allow for head room. The only head space that the system occupies is immediately at the fan.

In some instances where we have been unable to use a large fan we have sold two smaller sized fans, using this argument; two fans allow for a little greater flexibility and there are days when one fan will do a competent cooling job.

An interesting apartment house job is now being installed. Two shafts on either side of the apartment are extended from cellar to roof. On the roof a belt driven fan with housing (see August issue) is erected. From the halls at each floor openings are provided into the shaft to draw off the heat. All indications are that this is going to do a satisfactory job of ventilating the building.

In a number of cases where a cheap job is desired, where skylights with louver bases are already in place, a fan mounted horizontally in the wall has worked with startlingly good results.


WAYS IN WHICH HEAT IS LOST FROM THE AVERAGE HOUSE AND HOW IT CAN BE SAVED
KEY:
Heat loss when uninsulated.
Heat saving with insulation
1. Walls and Roof
44.4%
4 Inches of mineral wool stops 75% of this loss.
2. Window glass and Doors
26.6%
Storm sash and storm doors stop 60% of this loss.
3. House Crack
20.8%
Weatherstripping saves 30% to 70% of this loss, depending on the tightness of the window.
4. Floors
8.8%
4 inches of mineral wool saves 75% of this loss.
NOTE: Uninsulated heat losses are based on a survey of 450 typical houses by the American Gas Association.

Analysis of

Three Types of Heat Conservation

By J. R. von Sternberg, R. A.

WITH the development of modern insulating and heat-stopping materials over the last fifteen years has come a confusion of terms and claims that leaves the average home owner, builder and heating contractor bewildered and asking, "What kind of insulation—storm sash, weatherstripping or wall and roof insulation—will do the most for my house?"

Unfortunately, no general rules apply to all cases. To calculate exhaustively the heat losses from any one insulated building; estimating the cost of material and labor and the probable value of the fuel savings effected, will not solve the insulation problems of all houses. For everyone appreciates that a house in northern Minnesota has a far different insulation problem that one in Jacksonville, Florida. There may also be a considerable difference between two houses on the same street, due to differences in exposure, construction and room arrangement.

Nor can insulation's benefits be fairly compared on a first cost and return basis, although the cost of any building product will naturally be a factor in its use. Obviously, a man who spends $15 for a suit pays less than the man who spends $50; still the cheaper suit may prove to be the poorer bargain.

Insulation, besides reducing fuel costs in winter, however, is designed to improve comfort. Thus the first consideration of insulation value should be comfort. In winter, maximum comfort means maximum protection against loss of heat. In summer, maximum comfort means maximum protection against outdoor heat. These two objectives, then, winter and summer comfort, provide a fair basis of comparison of all insulating and heat-stopping materials.

But of the three types of heat conservation—storm sash, weatherstripping and wall and roof insulation—only wall and roof insulation provides any summer protection. Let us then consider the winter protection that each provides:

In winter, a house will lose its heat in several ways; Through its openings (such as windows and doors) and through its walls, floor and roof.

Weatherstripping, storm sash and double-glazing prevent loss of heat through openings, while insulation prevents heat loss through walls, floor and roof. Obviously both window and wall insulation are desirable, but in some cases, only wall insula-

The charts on these pages show graphically how heat is lost and what portion of these losses can be saved through application of common forms of insulation. Obviously, the percentages of loss and saving apply only to houses studied and should not be used for any and all houses.

◆

PERCENTAGE OF AREAS SUBJECT TO INSULATION

1. Total area of walls and roof in an average house 100%

2. Percentage of wall and roof area subject to insulation 90%

3. Percentage of window and door areas subject to storm sash and storm door insulation 10%

Walls and roof offer 9 times as much insulating area as window and door openings in the average house. This accounts for the exceptional heat savings effected by an efficient wall and roof insulation such as 4" of mineral wool.

tion is thermally practical. Following is a brief discussion of the relative effectiveness of these different materials:

Weatherstripping is a window seal. All windows leak cold air into a house around the sash and around the frame where it joins the wall. Weatherstripping will help seal the sash of the window, and caulking will help seal the frame.

The Guide of the American Society of Heating and Ventilating Engineers shows that poor windows, when weatherstripped, will admit about 10 percent less cold air than well-fitted, or average, windows not weatherstripped. Weatherstripping a tightly-fitted window will reduce its infiltration by about 30 percent.

Storm windows and double-glazed windows are also good heat-stops. The addition of an extra thickness of glass provided by storm sash, reduces the heat lost through the glass by about 60 percent. Storm sash, when applied over poor, or loose-fitting windows, also provide some weatherstripping action. When windows are very loose, this reduction may be as much as 50 percent of the infiltration.

But when storm sash are applied to average fitted windows, the Guide shows, very little reduction in infiltration is secured.

Windows in the average house, however, occupy only about 10 per cent of the total wall area. Reducing this heat loss does not reduce the substantial heat loss through the walls, floor and roof of the house. This loss, quite naturally, can be effectively reduced only by means of wall and roof insulation.

It can be seen, then, that in order to estimate the relative effectiveness of each of these types, it is necessary to know what share of the total heat loss is saved by each.

In an effort to indicate this relationship, the American Gas Association conducted a survey of heat losses from 450 typical houses and arrived at the following average heat losses:

1—Loss through walls and roof, 44.4 per cent. 2—Through floors, 8.8 per cent. 3—Through cracks, 20.8 per cent. 4—Through glass and doors, 26 per cent.

These figures represent only average losses. While they may not apply to every house, most houses, on the other hand, will lose their heat in the given proportions, no matter where they are located in the heating belt.

Taking these averages, and calculating the percentage of each saved by its respective insulation, using the rated efficiencies as given in the Guide of the A.S.H.V.E., we find that the following materials will give maximum protection against each of the four heat losses listed by the American Gas Association.

1. Four inches of mineral wool in side walls and second floor ceiling will effectively reduce the loss through walls and ceiling by about

(*Continued on page* 114)

PERCENTAGE OF TOTAL HEAT LOSS SAVED BY INSULATION

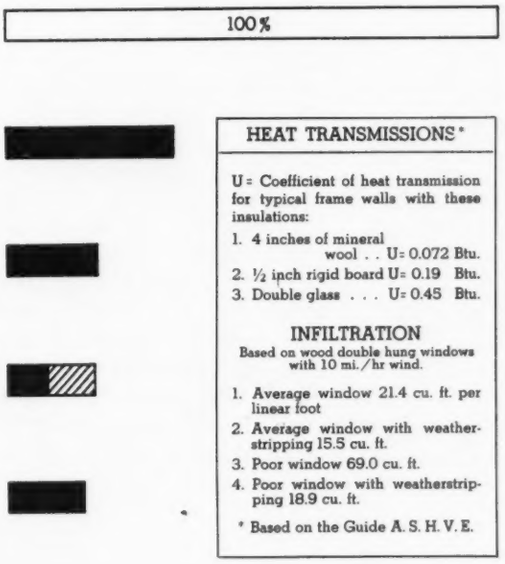
1. Total heat loss from average house — 100%

2. 4 inches of mineral wool in side walls and roofs saves 33%

3. Storm sash and storm doors save 16%

4. Weatherstripping saves 6% to 15%, depending on the tightness of the windows

5. One half inch rigid board on side walls and second floor ceiling saves 12%



HEAT TRANSMISSIONS*

U = Coefficient of heat transmission for typical frame walls with these insulations:

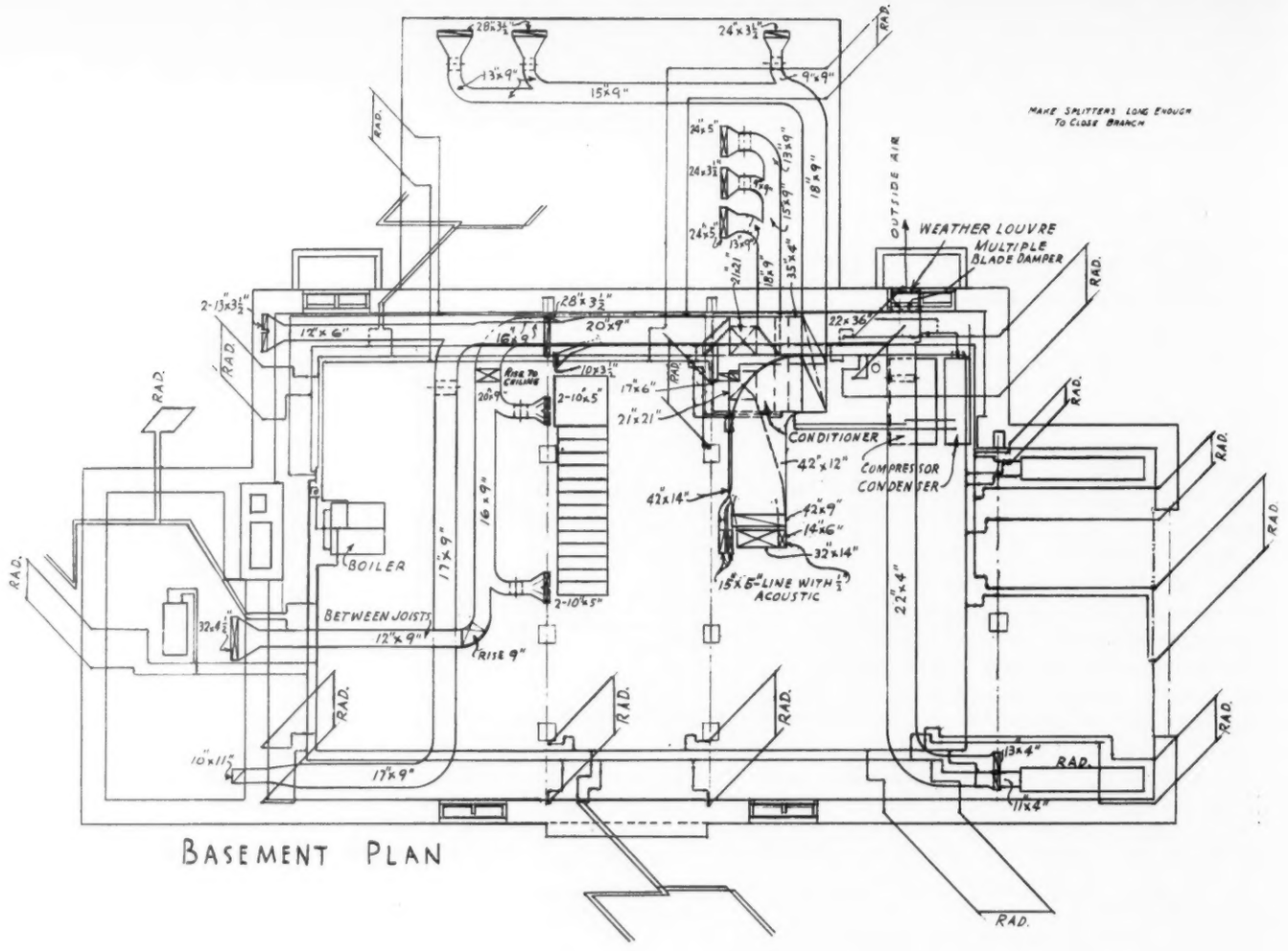
1. 4 inches of mineral wool . . U = 0.072 Btu.
2. ½ inch rigid board U = 0.19 Btu.
3. Double glass . . . U = 0.45 Btu.

INFILTRATION

Based on wood double hung windows with 10 mi./hr wind.

1. Average window 21.4 cu. ft. per linear foot
2. Average window with weatherstripping 15.5 cu. ft.
3. Poor window 69.0 cu. ft.
4. Poor window with weatherstripping 18.9 cu. ft.

* Based on the Guide A. S. H. V. E.



Air Conditioning a Radiator Heated Home

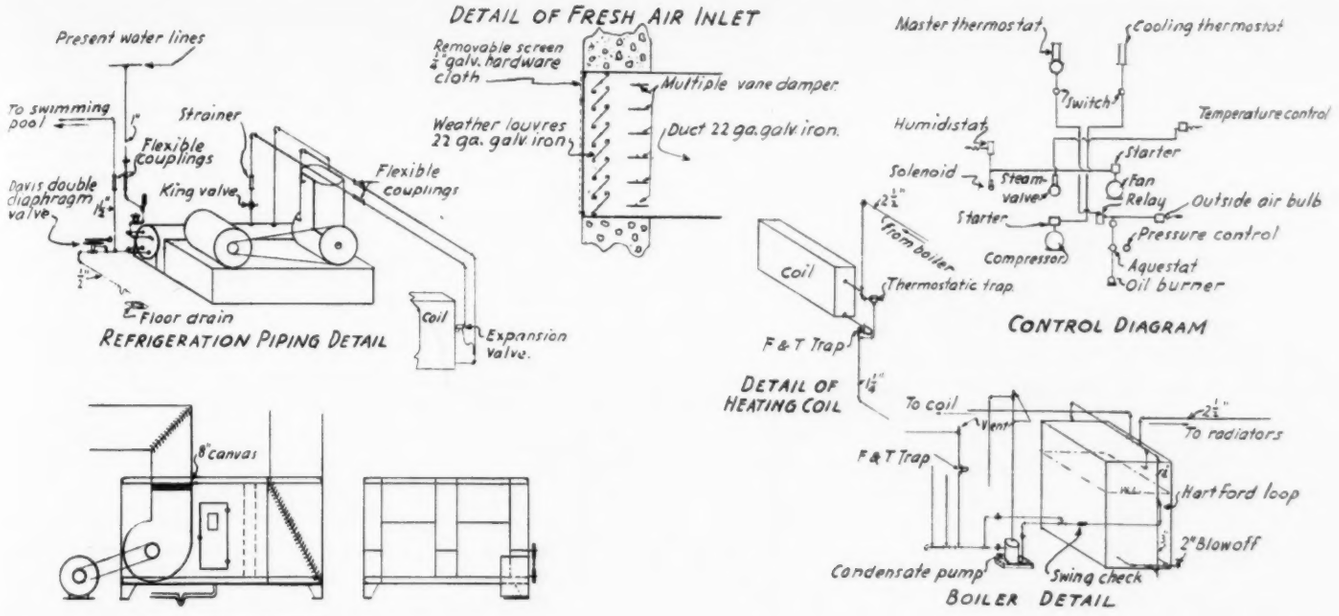
By D. D. Zink

Engineer-in-Charge, Air Conditioning Division,
B-D-R Engineering Corp., Kansas City, Mo.

YEAR round air conditioning for a radiator heated house, necessitates careful design and a proper control system. In the plant described herein a complete duct system was installed including a conditioner with heating coils, cooling coils, humidifier, filters, etc. to provide summer cooling and dehumidification, and winter ventilating, warming and humidifying. The radiators were changed to individual control and were utilized to carry the base heating load, offsetting the transmission load, and to provide for variations of temperature desired by the various occupants of the house.

The heat gains as well as the heat losses were calculated and radiator sections were added or removed as necessary to adjust radiator sizes to transmission losses (plus 20% for pickup) based on minus ten degrees outside temperature and 70 degrees inside.

The tempering coils for ventilation were selected to give 90 degrees entering air temperature while handling enough air to provide a 6-minute air change with approximately two changes of outside air per hour, make up (ten air changes per hour, total). It happened to work out that this figure also provided the right amount of air to give a 15-degree diffusion temperature for summer cooling. When the system was carefully adjusted to give even distribution during the cooling season, that same balance of air delivery from each register served equally well for ventilating during the heat-

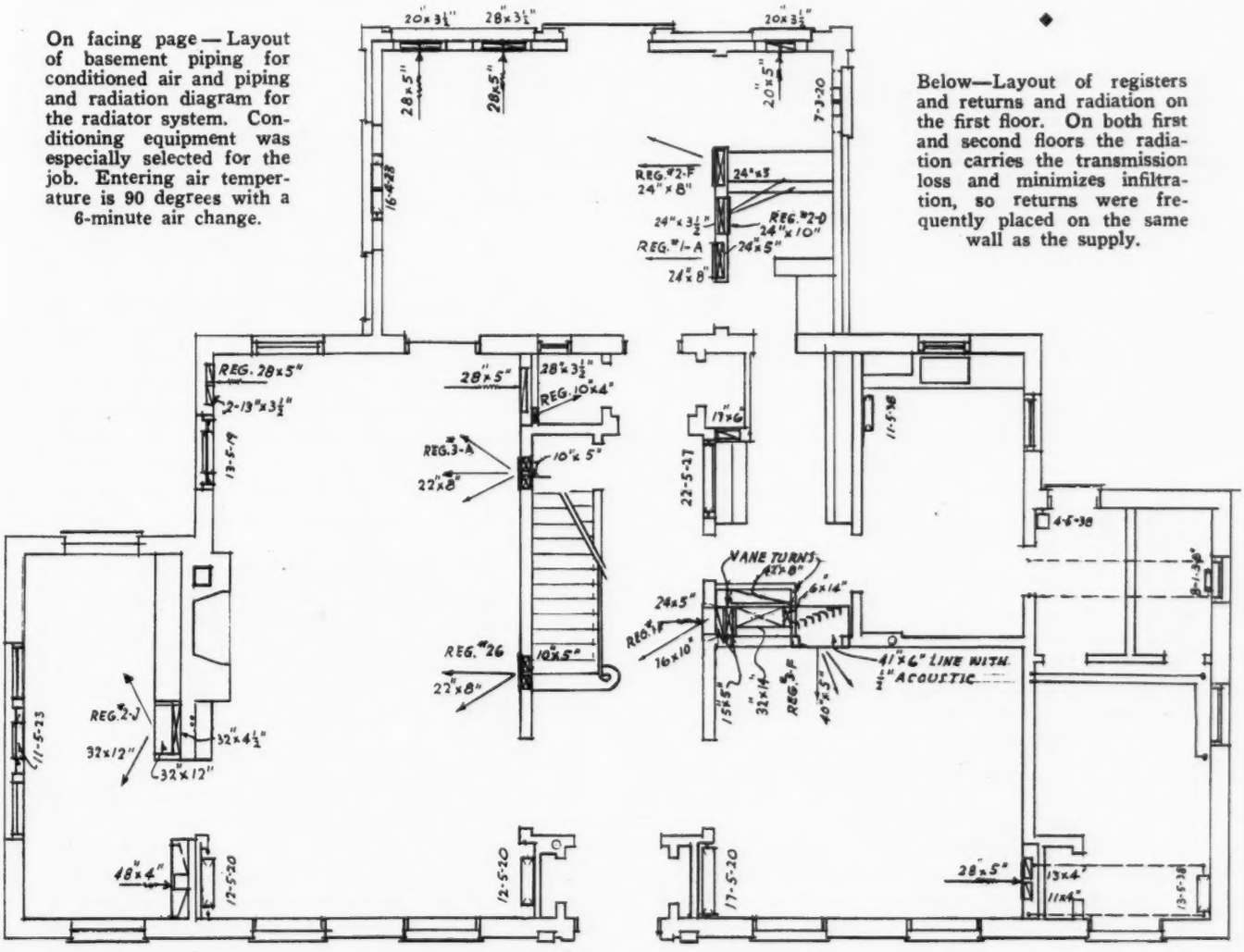


Above are shown details of some of the major equipment items in the installation. The boiler piping was converted for the addition of the heating coil. The control layout is explained in the text. The cooling coil is separate from the heating coil and is connected as shown. The conditioner, contains both heating and cooling coils, filters (250 fpm, maximum) and blower. Condenser is double capacity to conserve water.

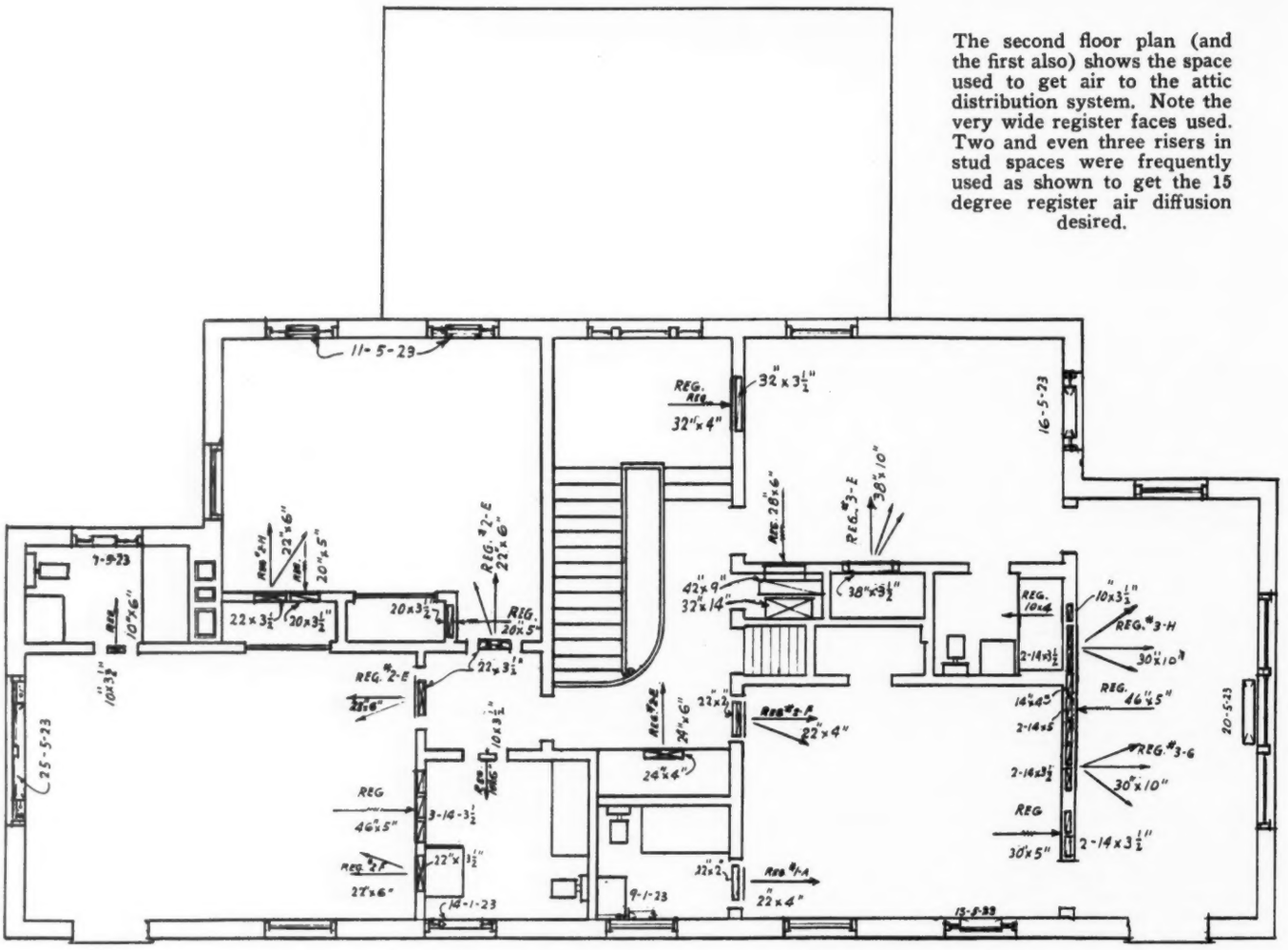
On facing page — Layout of basement piping for conditioned air and piping and radiation diagram for the radiator system. Conditioning equipment was especially selected for the job. Entering air temperature is 90 degrees with a 6-minute air change.

◆

Below—Layout of registers and returns and radiation on the first floor. On both first and second floors the radiation carries the transmission loss and minimizes infiltration, so returns were frequently placed on the same wall as the supply.



FIRST FLOOR PLAN



SECOND FLOOR PLAN.

The second floor plan (and the first also) shows the space used to get air to the attic distribution system. Note the very wide register faces used. Two and even three risers in stud spaces were frequently used as shown to get the 15 degree register air diffusion desired.

ing season and showed uniform results in the matter of ventilation, humidification and temperature.

The duct system was not zoned, and no trouble was experienced in maintaining summer balance of room temperatures.

Main trunk ducts from the basement were run through a second floor closet as shown on a drawing and where these ducts passed through the butlery on the first floor, they were furred around and plastered in.

Register and Return Locations

All supply registers were selected for proper coverage of space served on 15° diffusion, this resulting in very wide registers in many cases. This necessitated utilizing two and even three stud spaces per outlet as shown on the drawings. In these cases multiple blade dampers were used and the forward edge of the studding tapered and covered. Approaches were vaned.

Inasmuch as radiators were utilized to offset transmission loss, and infiltration was minimized by the introduction of outside air by the conditioner, it was believed unnecessary to place return outlets under windows as is common practice in the locality; and the supplies and returns were placed on the same inside wall wherever this simplified duct work.

The duct system was designed on an equal pressure drop per foot of length basis, starting at the unit with 900-foot velocity. This gave approximately 400 fpm to 450 fpm velocity in risers. The mains were lined from the conditioner 15 feet out in all cases, or past the third 90° turn, with ½-inch air acoustic sheet. The job is completely silent in operation.

Attic ducts were insulated with 1-inch of moisture resistant, fibreboard insulation fastened on 18-inch centers with box fastener bands—and sheet metal screws with large washers were used to support large panels. All points were filled and sealed with two layers 12-pound asbestos paper.

The Cooling System

A ten-ton Freon compressor furnishes cooling, with a direct expansion coil installed in a specially designed conditioner which also houses the blower, the heating coil, and filter proportioned to provide not over 250 fpm air velocity through the filter face area. A factory built conditioner was available, but the latent sensible ratio of heat gain was such that

much more air was required for proper operation, so the conditioner was designed to fit conditions exactly.

Double the usual condenser capacity was provided in a standard shell and tube type unit. Providing this extra surface reduced water consumption to the point where an evaporative condenser or cooling tower were not economically justifiable; the condenser providing better than 20° rise in water temperatures under the most adverse conditions.

The Control System

The control sequence is as follows: Winter—Pressure stat and low water cutoff operate oil burner to maintain constant 2-pounds of steam pressure except when interrupted by an outside air bulb set at 65° indicating no heat is necessary.

A modulating thermostat in the discharge duct from the conditioner operates a modulating steam valve supplying the coil in the conditioner, to provide constant air discharge temperature. Individual thermostatic valves on each radiator control the radiators to give uniform temperatures in rooms and provide for personal preferences in tempeature variations. The self-cleaning, spray type humidifier is controlled by a solenoid actuated by a return duct humidistat—the entire humidistat circuit being energized from the load side of the fan so that the humidifier is operative only when the fan is running.

Summer operation—Fan is operated manually by a switch in the first floor hall. A thermostat similarly located, actuates the compressor starter, with high and low limit controls in final command.

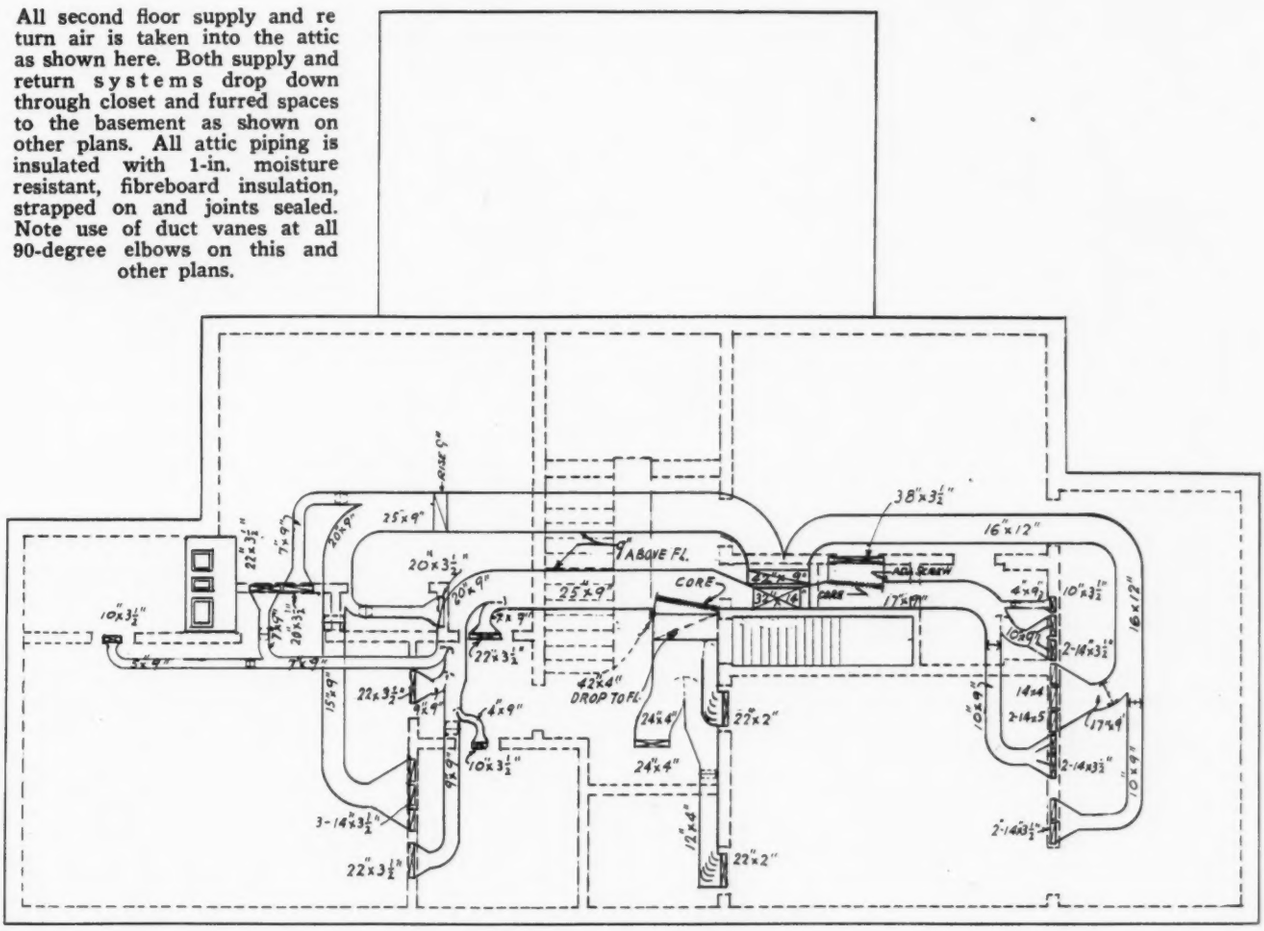
Operating Economy Features

An interesting feature of the system is the dual use of condenser cooling water and the water control. Water from the condenser flows through a balanced, back pressure valve to the sewer, or ahead of this valve to a lawn sprinkler system. The valve maintains 30 pounds on the sprinkler system and when the pressure exceeds 30 pounds as when sprinklers are shut off, the valve relieves to the sewer as long as the compressor operates.

The entire job has been outstanding in its complete lack of service call backs and the absence of any of the usual operating irregularities. The installation has proved to be at least one successful approach to the problem of modernizing a radiator heated house.

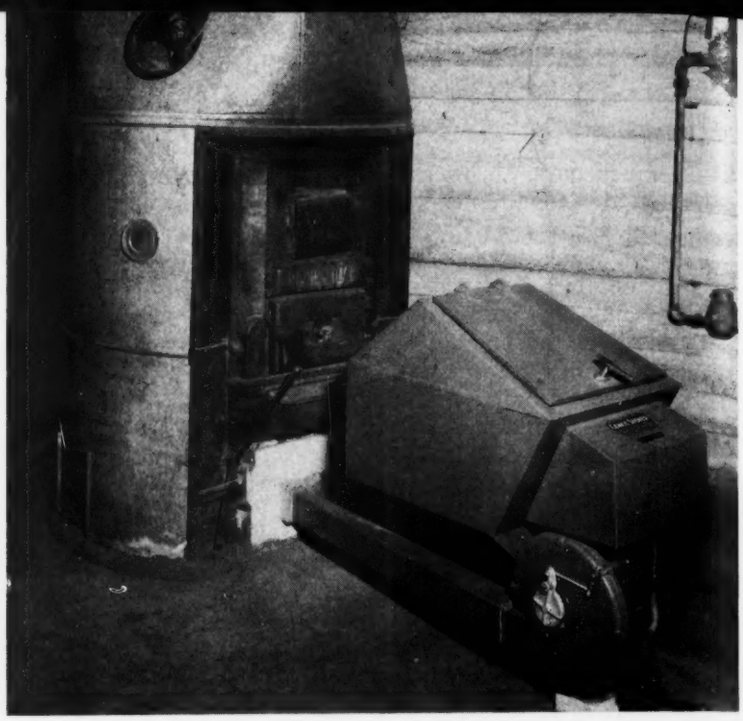
This entire installation was designed by the writer for Burke Miller, the general contractor. The sheet metal work, including the conditioner, was fabricated and installed by the Roanoke Sheet Metal Works and the refrigeration equipment was installed by the B. D. R. Engineering Corporation.

All second floor supply and return air is taken into the attic as shown here. Both supply and return systems drop down through closet and furred spaces to the basement as shown on other plans. All attic piping is insulated with 1-in. moisture resistant, fibreboard insulation, strapped on and joints sealed. Note use of duct vanes at all 90-degree elbows on this and other plans.



ATTIC PLAN

Pipeless Furnace, Stoker-fired Solves Printing Plant Heating Problem



A PERPLEXING problem in factory heating was solved in Rockford, Illinois, two winters ago by the installation of a coal stoker in a warm air heating plant—and solved with an amazing economy in fuel costs.

The owner of a one-story printing plant had made the error of trying to heat a long, narrow space with a pipeless furnace and found that even with constant attenion by hand firing he was unable to heat remote portions of the building. He installed an oil burner, but found that his trouble was not remedied. To the contrary, the presence of drafts and heatless extremities were accentuated because of the intermittent operation of the burner. The particular burner and furnace used were not suited to high-low or constant burner operation.

The owner (the Hendricks Printing Company) then tried an overhead, unit system with one heat transfer section and blower. His heating problem still was unsolved, as the blower seemed to force cold air downward with the result that the lower portion of the building was cold and drafty.

Mr. Hendricks' next move was to revert to his pipeless furnace, with heating provided by a gas burner. In addition to being more expensive, the same condition prevailed as with oil.

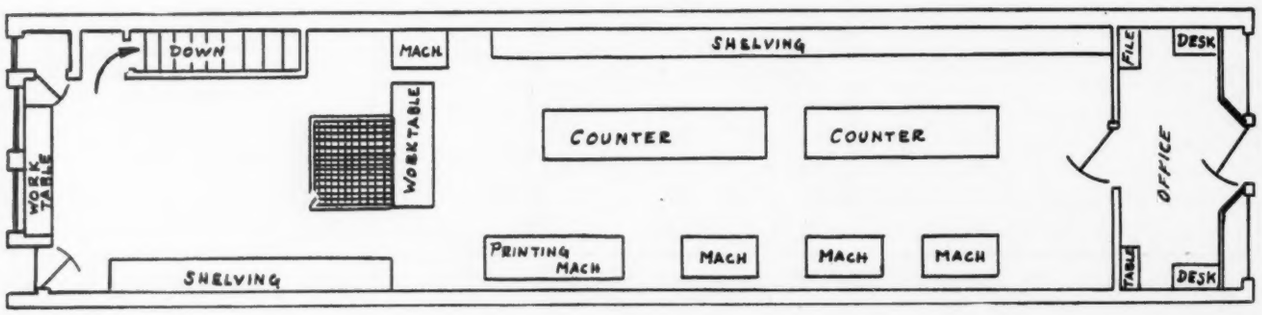
C. O. Newburgh, Rockford heating engineer and Conco dealer prevailed upon Mr. Hendricks to try the installation of stoker firing in the existing pipeless furnace. Front installation of a 30-lb. stoker was made with an ingenious installation of the limit control as shown in the accompanying photograph. Previous intense firing to gain satisfactory heating, had nearly burned out the furnace, but this was remedied at small expense by installing refractory brick.

The thermostat was placed midway between the floor register and the front of the room. (See floor plan.)

That winter, for the first time since the Hendricks firm have been in the building, they were able to heat comfortably all portions of the room, which contains 15,840 cubic feet (the room being 90 feet long, 16 feet wide, with 11-ft. ceiling). The constant heat provided by the stoker, plus the flow of considerable heat even when the stoker was not feeding fuel, kept a constant circulation of heat and totally eliminated drafts and cold corners.

By no means the least important result of the installation was a marked reduction in fuel costs.

Accurate check kept by Mr. Hendricks showed that gas heat had averaged $200 per season. Most of the season with the stoker the owner had used a $6.50 per ton stoker coal, but the last month of operation had used a coal costing $4.50 per ton which gave equal satisfaction. Even with the major portion of the fuel costs figured at the higher cost of $6.50 per ton, the total fuel cost for the 1936-37 season totalled only $80.

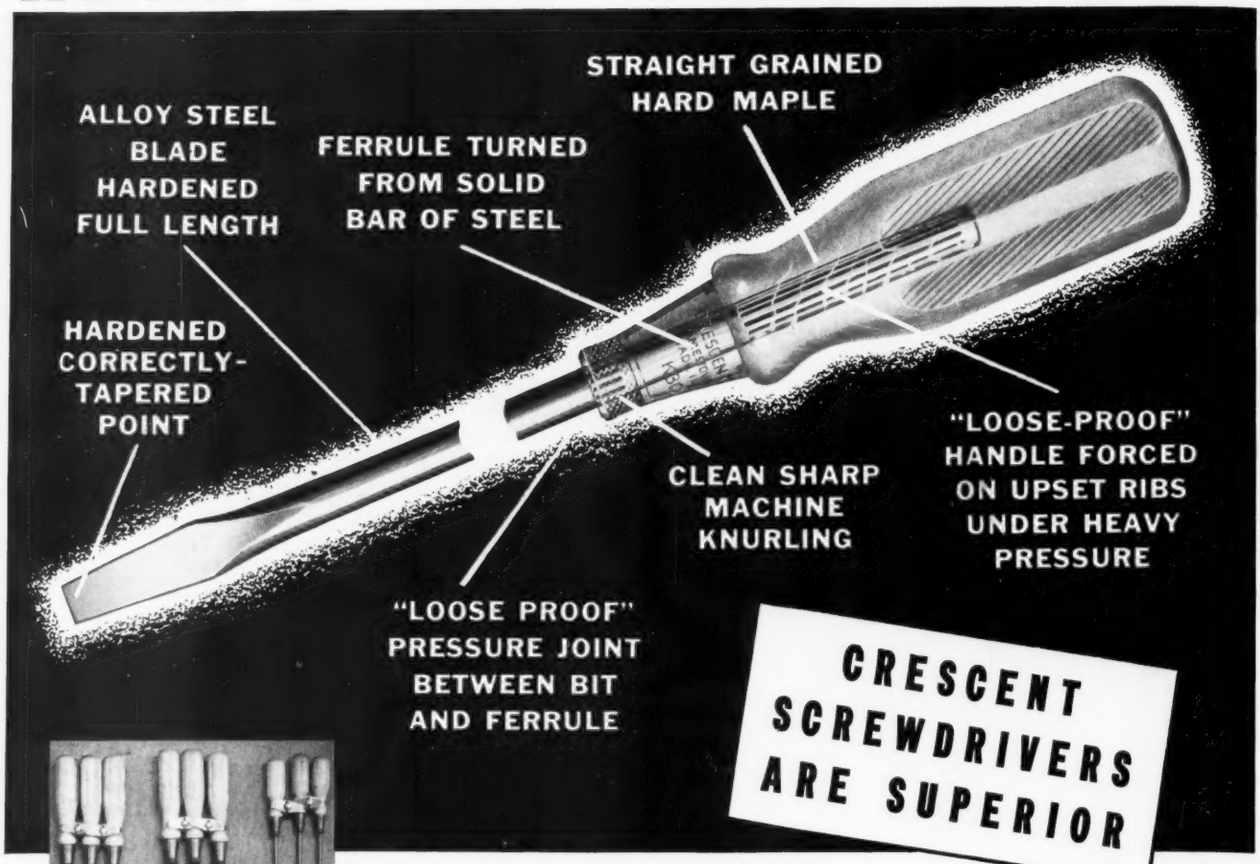


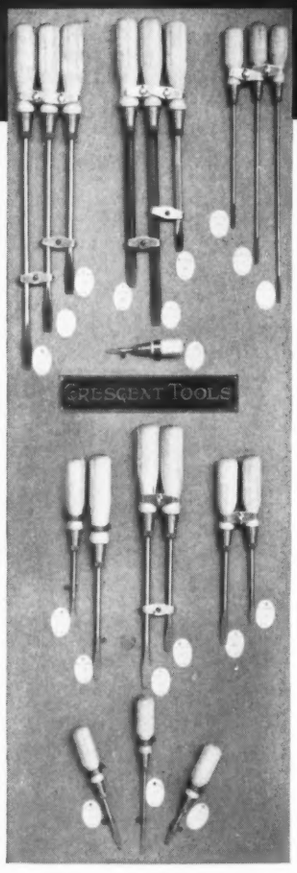
AMERICAN ARTISAN

SHEET METAL SECTION

DEVOTED TO SHEET METAL CONTRACTING AND FABRICATING

HERE'S THE REASON WHY


STRAIGHT GRAINED HARD MAPLE
ALLOY STEEL BLADE HARDENED FULL LENGTH
FERRULE TURNED FROM SOLID BAR OF STEEL
HARDENED CORRECTLY-TAPERED POINT
"LOOSE-PROOF" HANDLE FORCED ON UPSET RIBS UNDER HEAVY PRESSURE
CLEAN SHARP MACHINE KNURLING
"LOOSE PROOF" PRESSURE JOINT BETWEEN BIT AND FERRULE
CRESCENT SCREWDRIVERS ARE SUPERIOR



● There is a real reason why Crescent Screwdrivers are first choice in many of America's leading industrial plants. Examine the design and structural details illustrated above. Compare them with the usual construction found in ordinary screwdrivers.

Any mechanic knows it costs more to make screwdrivers the Crescent way . . . but he knows, too, that such methods produce a vastly superior tool. And Crescent superiority shows up in terms of greater safety for the worker—better work and more of it—and much longer tool life.

Crescent Screwdrivers and other fully-guaranteed Crescent tools are displayed and sold by hardware dealers and industrial goods distributors everywhere.

There are Crescents for every class of work—blade lengths from 1-1/2 to 12 inches. Make these fully-guaranteed screwdrivers *your* choice.

CRESCENT TOOL CO., JAMESTOWN, N. Y.

CRESCENT and Smith & Hemenway TOOLS

The Saucier shop, organized for the production of specialty items. Below—the list of overhead items Mr. Saucier presented to Minneapolis contractors.

Overhead Methods of a Specialty Fabricator

ALONZO P. SAUCIER, present owner and manager of the firm Charles Saucier and Son, Minneapolis, has, for many years, been recognized among his business associates as a fighting exponent of better business methods, better bookkeeping records, more thorough understanding and application of overhead expense. His espousal of overhead importance has been carried to the point of submitting to the Minneapolis Sheet Metal Contractors Association a list of the items which make up overhead and the discussion of this overhead expense item before numerous meetings of the association.

This interest in overhead and bookkeeping springs directly from Mr. Saucier's own experience during the time when his business was changing from one type of operation to another and during the time since that change. Some years ago this company did mostly outside sheet metal work, ventilating and a general contracting business. It became apparent to Mr. Saucier that there was a field for the fabrication or manufacture of certain sheet metal specialty items which should be produced upon a strictly manufacturing basis rather than as fill-in" items when other work was slack. Investigation disclosed that there was a number of specialty items looking for a manufacturer if proper production facilities were arranged for manufacturing. So the present specialty manufacturing business was launched. Today, outside sheet metal work has been practically abandoned.

Under the contracting business, estimating and bidding left some leeway for flexible bookkeeping and if costs didn't come out to the penny, no great harm was considered done. Under a manufacturing program, however, costs down to the last penny had to be known day by day and completely for every item manufactured. So the conviction that bookkeeping and overhead are highly important became of paramount importance and Mr. Saucier set about finding ways and means of improving his

MINNEAPOLIS SHEETMETAL CONTRACTORS ASSOCIATION
MINNEAPOLIS, MINNESOTA

OVERHEAD

1. Salary _____
2. Rent - Fuel _____
3. Int. on Invest. Equip. & Stock _____
4. Depreciation on Equipment _____
5. Auto or Truck:
   a- Depreciation _____
   b- Tax _____
   c- Gas & Oil _____
   d- Rent (Garage) _____
   e- Repairs Etc. _____
   f- Insurance _____
   _____
6. Office Help _____
7. Office Supplies:
   a- Stationary _____
   b- Stamps _____
   c- Checks _____
   d- Telephone _____
   e- Electric, Gas _____
   f- Power _____
   g- Misc. _____
   _____
8. Bad Accounts _____
9. Advertising _____
10. Insurance:
    a- Public liability _____
    b- Compensation _____
    c- Fire _____
    _____
11. Licenses - Association dues _____
12. Replacements on Equipments _____
13. Lost time, material, mistakes _____
14. Service Calls _____

TOTAL OVERHEAD _____

Number of Productive Labor hours per month _____

Form H 33-34-36

Job No. 1842 Order No. Self Phone

Date 12/5/38 Terms H.K.

Customer Abdelle & Co Address 701 E Bean Line on truck

Delivered to Sam How

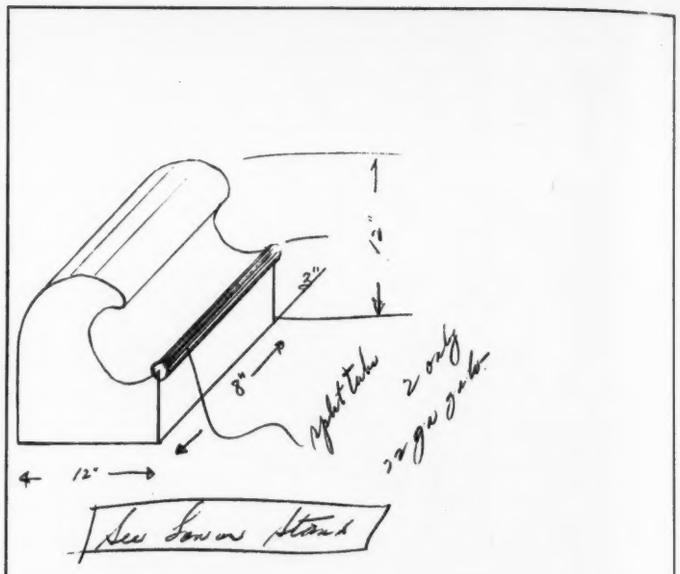
Promised 12/15/38 Completed Finished by

Description 2 Shields as per sketch x / Stand for Polishing Heads

MATERIAL Amount		EMPLOYEE		TIME	Clock Time	
7'	of 1/8 x 1 1/4 band iron	Jim	OFF		DEC 13	2 45
			ON	1:41	DEC 13	12 55
20#	22 ga gal iron	"	OFF		DEC 13	4 31
			ON	1:24	DEC 13	3 07
3#	24 ga gal "		OFF		DEC 14	10 25
		"	ON	2:31	DEC 14	7 54
24"	Split tube		OFF		DEC 14	3 07
		"	ON	1:04	DEC 14	2 03
			OFF			
			ON	5:100 60 6.40		
			OFF			
			ON			
			OFF			
			CN			
			OFF			
			ON			
			OFF			
			ON			
			OFF			
			ON			
			OFF			
			ON			
			OFF			
			ON			
			OFF			
			ON			

Work all gone over and found to be satisfactory Date

58 x 12



At left, above—Time clock side of shop card showing how job is fully identified; how time worked is entered by the clock; mechanic identified; and total time recorded. At top, right—Back of shop card showing typical sketch of item ordered. Below—White, office copy, of job card showing how materials are recorded by actual weight with cost; how labor is totalled by hours and labor rate; and the job summary with overhead and profit.

Form H 33-34-36

Job No. 1842 Order No. Self Phone

Date 12/5/38 Terms H.K.

Customer Abdelle & Co Address 701 E Bean Line on truck

Delivered to Sam How

Promised 12/15/38 Completed Finished by

Description 2 Shields as per sketch x / Stand for Polishing Heads

MATERIAL

Kind		Price	Amount
22 ga. gal.	20#	.06	1.38
24 ga. gal.	3#		
Split tube	2"	.05	.30
Band iron			
			1.68
Total			

LABOR

Employee	Hour	Rate	Amount
Jim	6:40	.125	8.42
	40		
	5:40		
	6:00		
Total			

SUMMARY

	Amount
Material	1.68
Labor	8.42
Total	
Overhead	6.00
Total Cost	16.10
Sales	
Total Profit	

then better-than-average cost records. The result is the overhead and cost method described in this article.

In developing this method of cost keeping, Mr. Saucier very naturally considered the customary methods of applying overhead. Overhead on both time and materials was discarded because Mr. Saucier feels this penalizes the buyer of expensive materials and much of the firm's work is in premium materials. Overhead on labor alone was discarded because, as generally applied, there is little distinction between actually productive labor and unproductive labor. However, Mr. Saucier did find that productive labor was the only stable item in his cost records so a variation of overhead on labor constitutes the basis for this cost record.

The Saucier cost system is based on overhead on productive labor only. To determine just what his overhead costs actually were, Mr. Saucier went back to his books for one full year and added in dollars all the overhead expenses. Into this overhead cost went the salary of the owner and the bookkeeper, social security and unemployment insurance costs, truck and car operating expense, telephone and direct mail costs, and all the other items shown on the overhead sheet used by Mr. Saucier for the contractors' schools. All labor like cleaning up the shop, service calls, work not applied directly to any one job, and so forth, were included in overhead.

From the records of one full year's operation Mr. Saucier found that his men work, productively, 11 months in the year at 40 hours each week. This

Job No. _____ Order No. _____

Date _____ Terms _____

Customer _____ Address _____

Delivered to _____ How _____

Promised _____ Completed _____ Est. Cost _____

Description _____

MATERIAL		SHOP LABOR				
Amount	Kind	Date	Employee	Start	Finish	Hours

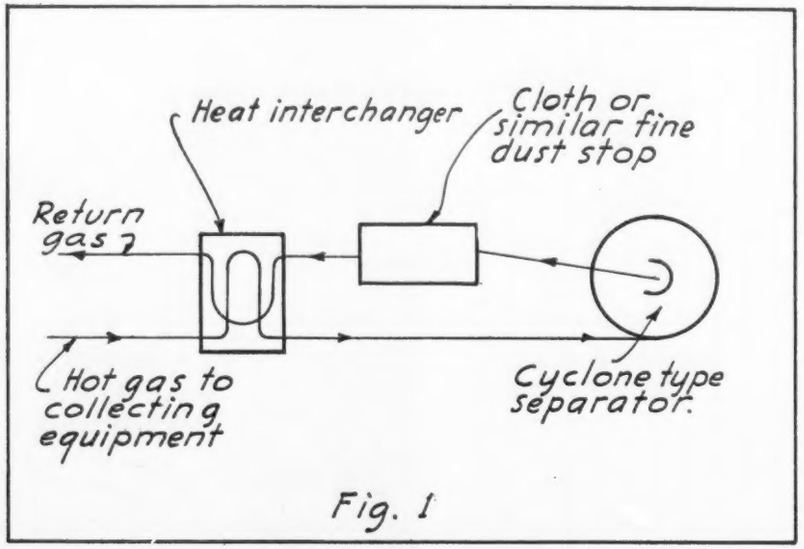


Fig. 1

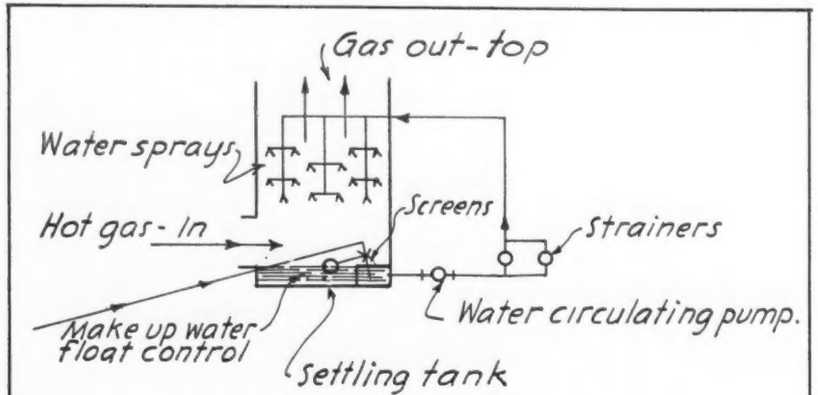


Fig. 2

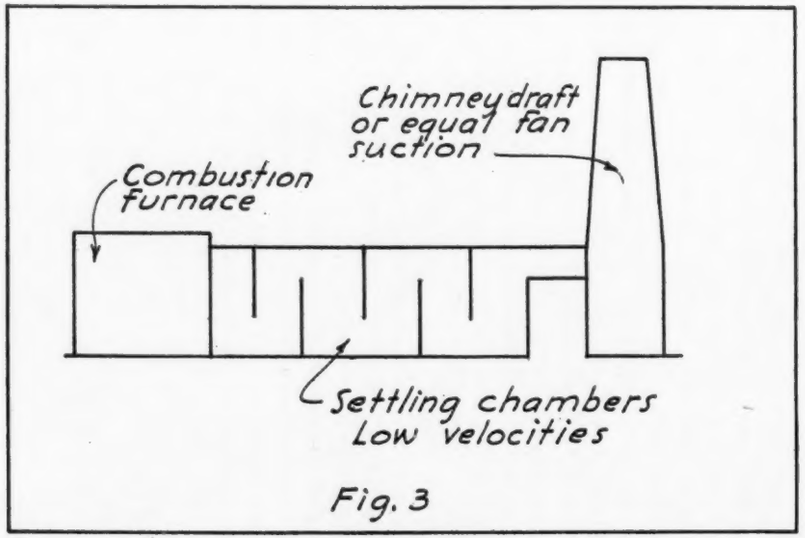


Fig. 3

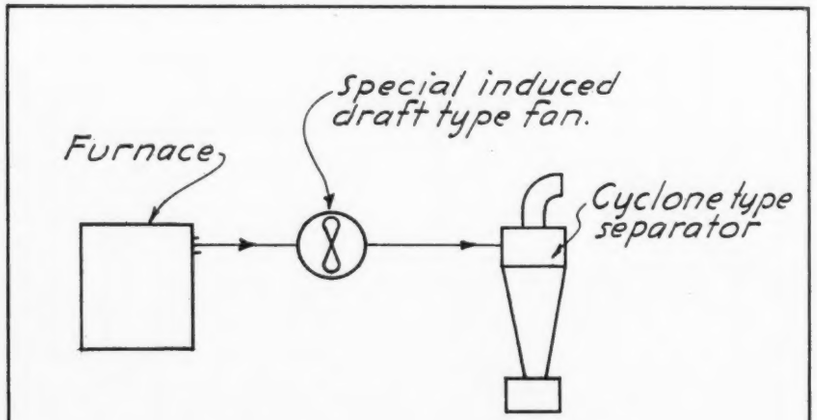


Fig. 4

A Collecting System For Hot Gases and Hot Materials

By J. W. Baybutt

MATERIAL laden hot gases sometimes offer a problem to the dust collecting engineer particularly if the material is valuable or the air has to be discharged into a congested area. The first thought that should come to mind in such a problem is—"Why can't we recover the heat?" If heat conservation is economically desirable and practical, then the materials collection can be handled in a number of ways. Diagram No. 1 shows an arrangement assuming the heat interchange can be resorted to.

Diagram No. 2 shows a water spray scheme that would offer possibilities on certain materials. Corrosion difficulties would be encountered with this scheme unless special construction materials were used. The air velocity through the sprays probably will be influenced by the value of the material and per cent of recovery demanded. This same value also will tend to determine the amount of water that will be used, the more fresh and cool water used generally resulting in more efficient dust recovery with such a scheme. The actual material recovery can be accomplished through line strainers or a settling basin from which the water can be evaporated leaving the valuable material in dust or cake form. A heat balance will have to be maintained with such a scheme as the dust will be carried along with the vapor if all the water is evaporated.

Diagram No. 3 shows another scheme that can be used on high temperature, material-laden air. Such a scheme demands high installation cost, but should have very little maintenance connected with it.

Diagram No. 4 shows a simple arrangement if the gas can be discharged to the atmosphere after most of the material has been removed. The high temperatures existing will demand induced draft fan construction and possibly a special heat resisting separator, but for ordinary combustion temperatures these readily can be obtained. There are centrifugal type separators that can do a good job of removing dust under certain conditions.

There is also electrical collectors that will operate on high temperature gases, but here again corrosion must be reckoned with. Some dusty materials are explosive which may tend to influence a designer against such equipment, not from the regular operating standpoint, but in case of defective installation.

Definite information on temperatures and value of material to be recovered will naturally influence the designer in the type of equipment he should suggest.

Weight Per Linear Foot For Galvanized Rectangular Ducts

Size of Duct	24 Gauge											
	19	20	21	22	23	24	25	26	27	28	29	30
6	5.42	5.64	5.85	6.07	6.29	6.5	6.72	6.94	7.15	7.37	7.59	7.8
7	5.64	5.85	6.07	6.29	6.5	6.72	6.94	7.15	7.37	7.59	7.8	8.02
8	5.85	6.07	6.29	6.5	6.72	6.94	7.15	7.37	7.59	7.8	8.02	8.24
9	6.07	6.29	6.5	6.72	6.94	7.15	7.37	7.59	7.8	8.02	8.24	8.45
10	6.29	6.5	6.72	6.94	7.15	7.37	7.59	7.8	8.02	8.24	8.45	8.67
11	6.5	6.72	6.94	7.15	7.37	7.59	7.8	8.02	8.24	8.45	8.67	8.89
12	6.72	6.94	7.15	7.37	7.59	7.8	8.02	8.24	8.45	8.67	8.89	9.10
14	7.15	7.37	7.59	7.8	8.02	8.24	8.45	8.67	8.89	9.10	9.32	9.54
16	7.59	7.8	8.02	8.24	8.45	8.67	8.89	9.10	9.32	9.54	9.76	9.97
18	8.02	8.24	8.45	8.67	8.89	9.10	9.32	9.54	9.76	9.97	10.2	10.42
20	8.45	8.67	8.89	9.10	9.32	9.54	9.76	9.97	10.2	10.42	10.64	10.85
22	8.89	9.10	9.32	9.54	9.76	9.97	10.2	10.42	10.64	10.85	11.06	11.29
24	9.32	9.54	9.76	9.97	10.2	10.42	10.64	10.85	11.06	11.29	11.5	11.72
26	9.76	9.97	10.2	10.42	10.64	10.85	11.06	11.29	11.5	11.72	11.9	12.13
28	10.2	10.42	10.64	10.85	11.06	11.29	11.5	11.72	11.9	12.13	12.35	12.56
30	10.64	10.85	11.06	11.29	11.5	11.72	11.9	12.13	12.35	12.56	12.78	13.0

Ledkote Products Co., Specializes in Leadcasting and Leadcoating

By R. C. Nason

St. Francis bird feeder, sculptured by Mrs. Kenneth Brooks Low, New Rochelle, N. Y., and cast in lead by Ledkote Products Co. The figure is 23 inches high and automatically keeps grain at the feet of the Saint.

ONE of the most interesting fabricating plants serving the sheet metal industry is believed to be that of Ledkote Products Co., L. I. City, N. Y., and Everett, Mass., who process pure lead and lead-covered copper, brass and bronze items. Aside from such specialties as garden ornaments, weathervanes and the like, almost the entire output of this plant has to do with the constantly growing demand for leadcovered metals for building construction.

According to L. Kane, vice-president, at the Long Island plant, the 15 years of his company's business history have been packed with activity and human interest. Explaining the latter, he related the instance of a local sculptress, Mrs. Kenneth Brooks Low, New Rochelle, N. Y., for whom the Ledkote Products Co. has made many dozen 23-in.-high statues of St. Francis in cast lead. These garden ornaments serve the useful purpose of bird feeding stations via an interior seed chute that keeps food for "feathered friends" always in the extended hand of the Saint.

Or he might have cited another of his company's contracts wherein they stamped of leadcoated copper a large eagle for a New England townhall.

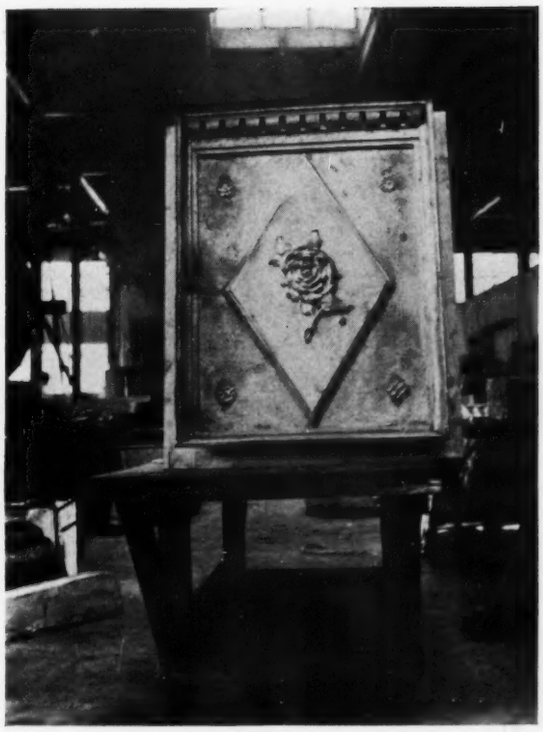
The great bulk of this fabricator's output, however, consists of preformed leadcoated copper gutters and leaders, cast leader heads and leader straps, of which their stock list presents a wide variety as to size, weight and grade.

Besides regularly making the foregoing stock items, the Ledkote plant handles considerable coating business that embraces sheeting and articles made by sheet metal contractors on special order. The hot dip process is used throughout. So generous are the dipping facilities here that at least one hot-lead vat can contain 40,000 lb. of this metal when filled. It is 16 ft. long by 4 ft. 6 in. wide by 3 ft. deep.

Leadcoating Principles

Though many of the facts about leadcoating are held confidential by the factory. Mr. Kane revealed that articles to be leadcoated first have to pass through three different pickling processes by dipping plus a fluxing dip before being lowered mechanically and withdrawn in the same manner from the molten lead dip tanks. Dirty surfaces do not permit adhesion of hot lead. Copper, brass and bronze are the only basic metals that receive treatment in the Ledkote plant.

It is claimed that this type of coated metal continues to grow in favor for a number of reasons, as outlined by vice-president Kane. The covering prevents stains; the grey finish, being neutral, harmonizes with practically all architectural styles; the color lends an air of distinction, lead is ageless. Leadcoated copper has to a certain extent replaced solid lead because it offers exterior protection and appearance value, but retains the high tensile



strength of copper. Being lighter than the solid basic metals such as lead, it is more easily and less expensively supported, referring to such portions of architectural expression and utility as gutters and leaders. The sulphuric air content of cities, also the salt characteristic of seashore air, do it little damage. Not long ago, further cited Mr. Kane, a wealthy private estate owner, whose place is near a chemical plant, replaced bright metal with leadcoated sheeting and has secured superior service.

Standard Finishes

A variety of styles and finishes are regularly offered in leadcoated copper by this fabricator, all fulfilling definite architectural demands. For instance, there is what is referred to as "ripple" finish, in standard grade. This grade has 12 to 15 pounds of lead covering per 100 square feet. Then there is the "Standard, smooth," of the same coating weight, but plain finish.

Next is the "Heavy," which has 25 to 30 pounds lead coating on both sides of the sheeting. Then there is "Extra Heavy," using 50-pound coating, recommended for gutters, leader heads and leaders on account of the severe duty entailed. Lastly, is the "Old English" finish, wherein 6-pound coating has been applied to one side and 40-pound coating to the other. The latter finish is rough in appearance to resemble ancient English cast work which has come down through the centuries as unusually serviceable for architectural embellishment and protection. Practically all the foregoing types and grades are stocked by Ledkote Products Co. both at their Long Island and their Everett, Mass., plants.

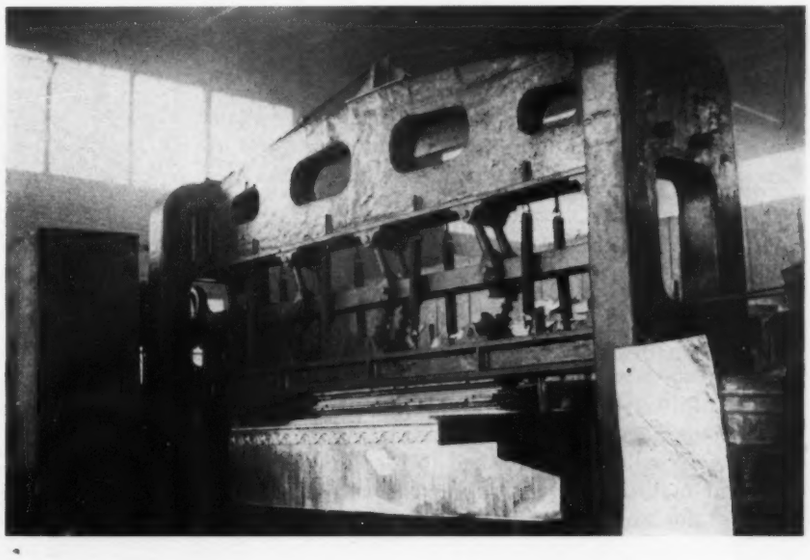
Recently, also, there have been made available gutters, leaders, leader heads and straps in lighter, cheaper basic metals, both bright copper and lead-covered, to meet the widespread, lowcost housing demand.

Leadcoating and Stamping

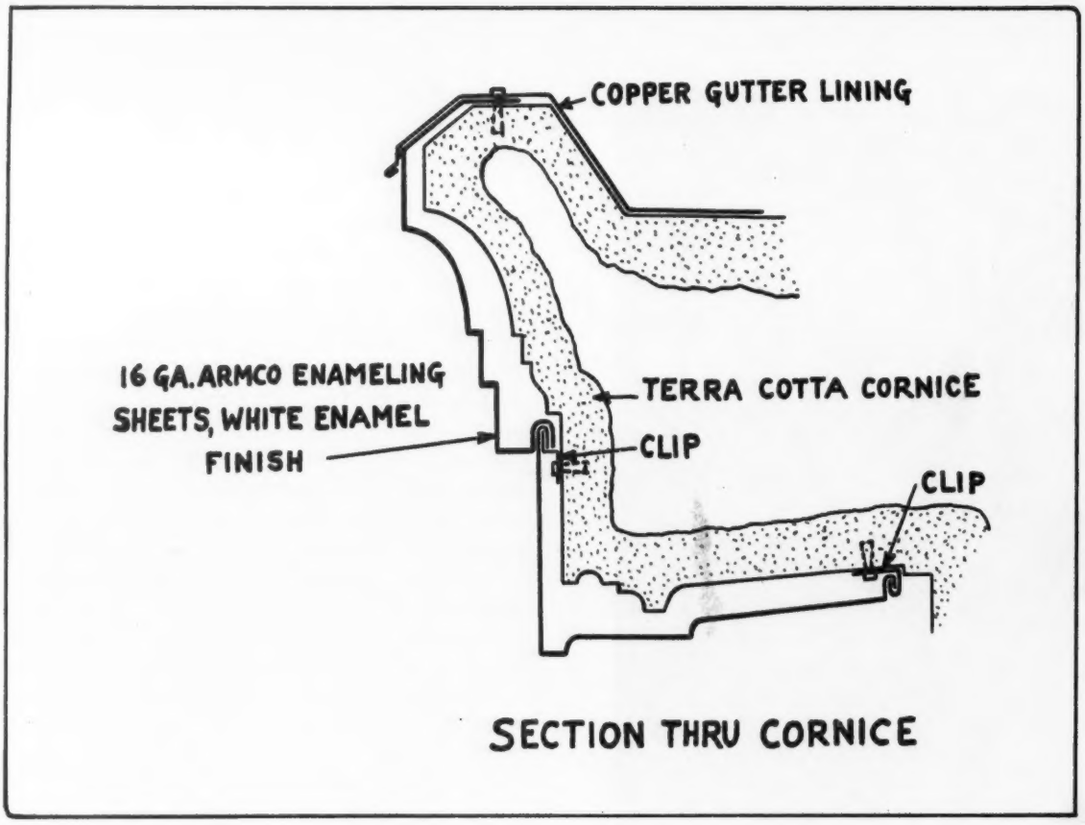
Aside from sheetwork as just outlined, this fabricator devotes considerable attention to lead casting and stamping. Facilities were enlarged three years ago when Ledkote acquired certain equipment from Hope Windows, Inc., an old and favorably known former maker of cast lead work. On the mantel of Mr. Kane's office there are a large goose and two owls, of cast lead. They represent two of many different models of garden ornamental items.

A typical example of the special order work done by this firm is the 3 foot by 4 foot cast pure lead panel (see photograph) that is to become part of a bay window for a private estate. The piece, weighing 125 pounds, when photographed had a large flower in its center; several small rosettes were being attached by blow torch wherein oxygen and illuminating gas, mixed, provided necessary heat

(*Continued on page* 110)



Above—Cast lead spandrel, one of fifty, to form an ornamental bay window in a residence. Size—3 by 4 feet, weight 125 lbs. Sheet metal contractor installing—A. A. Green, Mt. Vernon, N. Y. At right—Ten-foot toggle press forming a section of an ornamented, lead coated copper gutter.



Metal Covering for an Old Cornice

By A. A. Kellogg

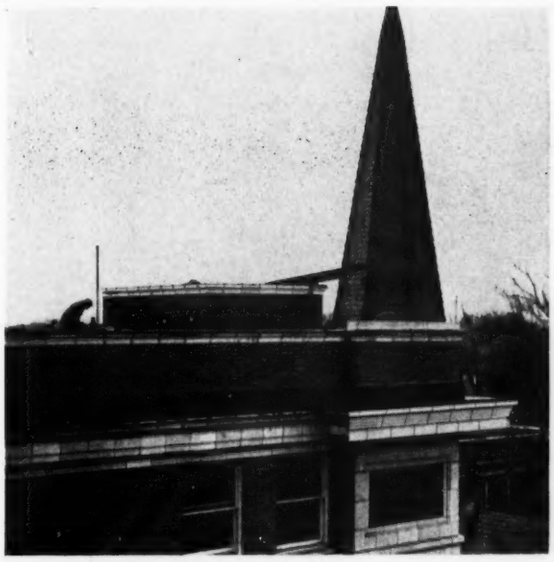
President, James Ackroyd & Sons, Albany, N. Y.

THE office building of the Glens Falls Insurance Company at Glens Falls, N. Y., is a building V-shaped in plan, five stories high, and occupies a site on a prominent square of the city. As constructed originally, the building is topped with a terra cotta cornice approximately 2 feet 6 inches high and 2 feet in projection. This terra cotta cornice conceals the copper-lined gutter which was turned into a reglet along the top of the cornice. The terra cotta cornice, being lighter in color than the walls of the building and being of considerable size is a prominent feature of the architectural appearance.

Due to the severe winter conditions in Glens Falls the terra cotta, after some years, began to chip; pieces broke away; the joints began to disintegrate until the cornice, generally, presented a very poor appearance. Of more importance, of course, the possibility of pieces of the material falling to the sidewalk, with attendant danger to pedestrians, became a very definite hazard.

We were called in and asked to recommend some practical method of overcoming the condition. To remove the cornice and replace with marble to match the remainder of the trim on the building was an expensive proposition; if we replaced the terra cotta with a metal cornice, the expense was likewise costly if the old cornice was removed.

The Glens Falls, N. Y., office building with the new metal cornice which defies detection.



Left—Part of new metal cornice in place (front) and old terra cotta cornice at rear. Right—The new metal cornice was installed in sections from scaffolds swung from the roof as shown. The text explains how the sections were formed and joined in place.

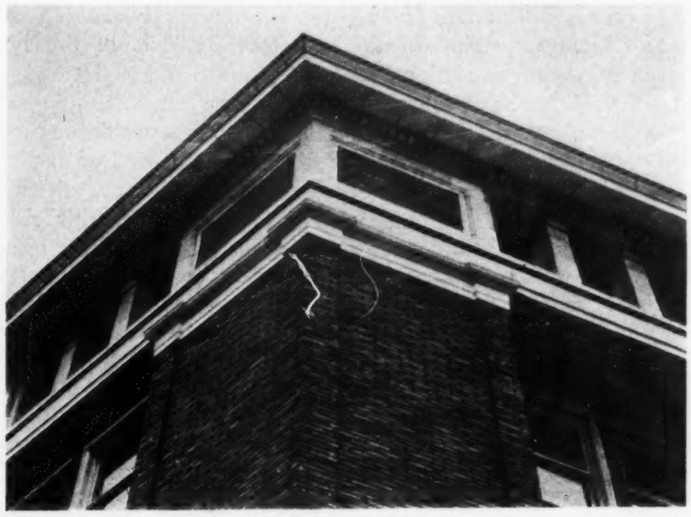
After studying the situation, we designed a metal covering for the old cornice, closely following the original contour, and made of 16-gauge Armco Ingot enameling iron, enameled white, with black stripes to represent the mortar joints of the original cornice. The result is that the finished job appears practically like the old cornice. This solution allowed the present copper gutter lining to remain undisturbed and eliminated the necessity of removing the old cornice.

The big problem was to provide for ample contraction and expansion and for suitable fastening, since the new cornice is quite heavy. The problem of erection also had to be considered carefully.

We made the cornice in 8-ft. lengths and in two sections (see sketch). At the end of each section, we welded a strip on the inside of one section which covered the joint. This eliminated fastening the joint together and allowed free movement, the joints being left ¼-inch wide. The lower section of the cornice was held by continuous clips formed as shown in the sketch, and these clips were expansion bolted to the old cornice. A lock was placed along the lower edge of the lower section of the cornice and this was set over the continuous clip, thus allowing free movement. At the bottom of the top portion of the cornice a lock was made which was set over the upper lock on the lower cornice. This secured the top member to the lower section at the same time making the connections waterproof and allowing free movement. The top was carried over the top member of the terra cotta cornice a sufficient distance to connect under the copper gutter lining and was then secured with expansion bolts placed through elongated slots in the metal cornice, to permit free movement. A metal half ball covered the head of the bolt.

All the metal work was formed before being enameled. All bolts were brass with suitable washers and the new cornice was made sufficiently larger than the old to cover any irregularities of the old, and permit lining up in a true straight line.

The job was erected in the summer of 1937 and has withstood two winters, with splendid results.



View of the soffit of the completed metal cornice. The dark lines are painted black stripes on the enameling iron. Note in the sketch on the facing page how closely the metal covering follows the contour of the old terra cotta cornice.

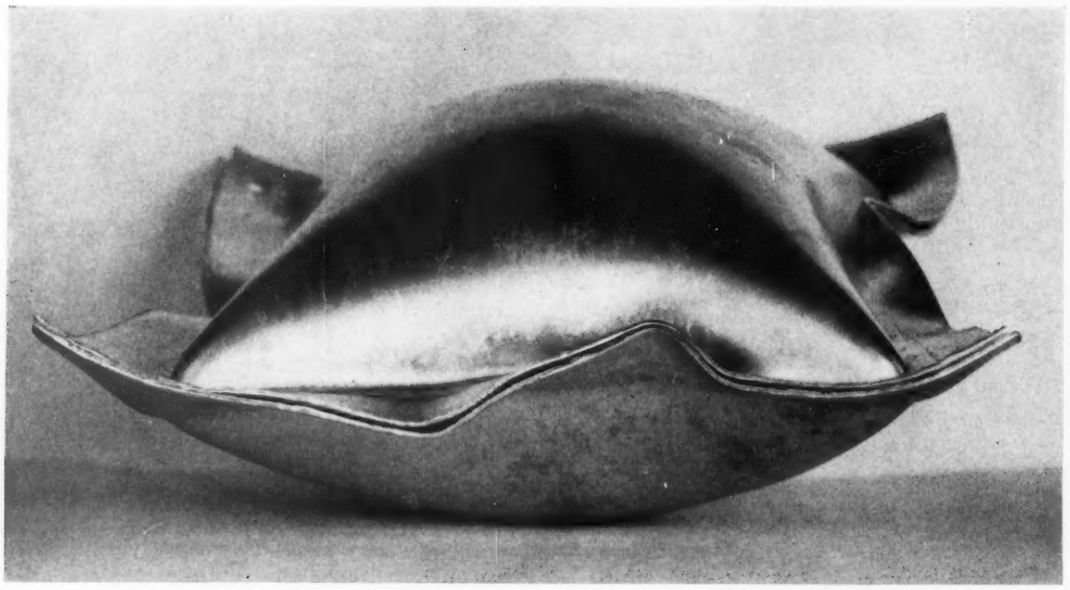


Fig. 1—Everdur pillow. 5 in. square, 0.040 in. thick flat Everdur sheet resistance welded around edges. Withstood 1,000 pounds per square inch hydraulic pressure before tearing at the weld.

Resistance Welding of Copper Alloys*

By Ira T. Hook†

IN these days when light weight sheet metal is being given more and more consideration, the resistance welding processes have been accorded first rank as the method of making connections. While the greater bulk of sheet so used belongs to the ferrous group, there are numerous instances where copper alloys are advantageously used with resistance welded connections. Thus in the manufacture of cooper alloy tanks and containers, in the assembly of innumerable types of electrical appliances, apparatus for the chemical industries, corrosion-resisting structural members and architectural assemblies, resistance welded copper alloys find many applications.

Several valuable papers have appeared recently in the Journal, in Metals & Alloys and elsewhere on the fundamentals of resistance welding. In this discussion, however, we are interested chiefly in the results obtainable in the resistance spot and line or seam welding of copper alloy sheets. The data contained herein cover a period of investigation begun in 1930. In a sense it is a progress report, since improvements are being made in resistance welding equipment and in new copper alloys adapted to show improved resistance welding performance.

Types of Resistance Welding

While we are principally concerned herein with the resistance welding of gas tight seams in copper alloy sheet, some work has also been done with other types of resistance welding. In all of the work on copper alloys, we have found that the one requisite is that the metal be melted at the time the two parts are given their final push together. Straight resistance butt welding is, therefore, not well adapted to the welding of copper alloys.

Flash butt welding, on the other hand, offers a very good way of uniting rods, sheet edges and shapes. The metals are brought into contact with the current on and the consequent arc allowed to play across the faces until the metal is molten—in from a fraction of a second to perhaps 3 seconds—and the final push-up made **quickly** and **lightly.** It must be quickly to catch the faces while the metal is still molten and lightly in order to avoid too great an upsetting of the metal while it is in the hot short[1] condition.

As has been pointed out many times, the cooper alloys do not possess a long pressure weldable temperature range similar to that of iron or low carbon steel. The latter becomes plastic for several hundred degrees before it actually melts. In this plastic condition welds in steel can be made by pressures in a rather wide range of intensity. With the copper alloys, this pressure weldable range, while the metal is still in a plastic state, does not obtain. The copper alloy must actually be melted to obtain a satisfactory weld. This fact, since the latent heat of fusion of the copper alloy is rather high, explains in a measure the high heat energy required to weld

*Reprinted by permission of the American Welding Society from American Welding Society Journal, October, 1935.

†Research Engineer, The American Brass Co., Waterbury, Conn.

[1]All copper alloys do not have this hot short range but many of the more important ones do.

Photographs by courtesy of American Brass Co.

even the Everdurs.

The resistance butt and flash welding machines commonly built for welding steel usually do not have the light pressure and fast action that is needed for the successful flash welding of the copper alloys. There is no reason, however, why such skill cannot be built into a machine.

Resistance Spot and Seam Welding

Where the metal is confined as it is in a spot weld or a seam weld, which is usually a series of spot welds from ten to twenty to the inch merging one into the other, the same conditions obtain, i.e., the metal must be melted and the push-up quickly and lightly made. Thus, the pressure between welding wheels should be very exactly controlled and the vertical guides for the movable spindle provided with roller bearings so that no part of the welding wheel pressure will be lost in friction. Various speed changes and various heat taps should be provided. The timing of the heat pulses may be effected mechanically or, better still, by the use of thyratron tubes or a photoelectric cell.

Owing to the high electrical and thermal conductivity of the low zinc brasses, commercial bronzes and beryllium coppers a capacity of 150 kva. is usually required. With the Everdurs, aluminum bronzes, phosphor bronzes, common brasses, silicon brasses, nickel silvers and cupro-nickels which have lower heat and electrical conductivities, a lower capacity machine will be found satisfactory.

Since the welding operation is not accompanied by a chemical change, the short-time heat pulses so necessary with some of the ferrous metals are not so essential with most of the copper alloys. However, a short heat-on period is desirable on the precipitation hardening alloys such as beryllium copper in order to avoid softening of the metal around the weld. Moreover, fast welding speeds are beneficial in such alloys as the Everdurs and the silicon brasses, as the quick freezing results in a finer grain.

Copper Alloys Discussed

Of the many hundreds of copper alloys, we may cite those listed in Table 1 as being representative.

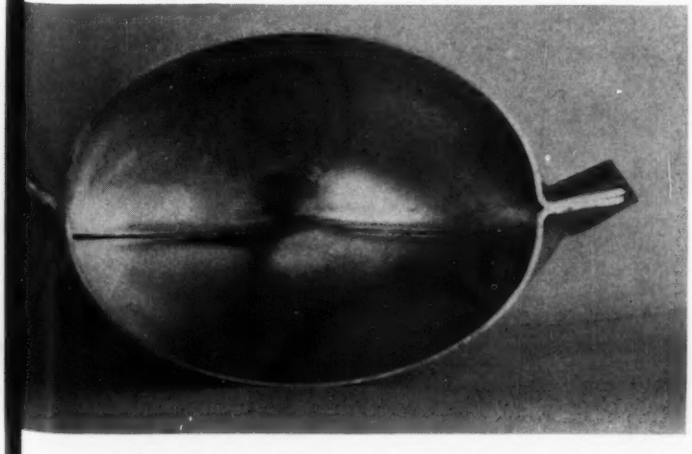


Fig. 2—Inside of Everdur pillow shown in Fig. 1. Note uniformity of individual "stitches" making the seam weld.

It will be noted that these representative copper alloys have been roughly arranged in the order of their resistance weldability. It will be noted further that this arrangement is approximately inversely proportional to the electrical conductivity. Thus the Everdurs, with very low conductivities, are at the head of the list for resistance welding and pure copper with an electrical conductivity of 100% is regarded as the poorest metal for resistance welding.

As would be expected, the thermal conductivity parallels the electrical conductivity quite closely. It is the combined effect of these two properties that makes copper and the high conductivity alloys so difficult to resistance weld rather than any inherent difficulty in getting the metal to flow together. Thus the low electrical resistivity means low heat for a given kva. and even this low heat is largely conducted away by the surrounding metal. Heat pulses of short duration (and therefore of high intensity) help to minimize the heat loss due to the high thermal conductivity of the metal. Projection welding in copper sheet could probably be accomplished without difficulty were there 200 kva. available at the electrodes and the heat pulses were made sufficiently short.

Effect of Alloying Elements

Since pure copper is not readily weldable by resistance methods, we are interested in determining what alloying elements in copper are most effective in producing a satisfactory sheet metal suitable for resistance welding. At the top of the list we note the three Everdur alloys with three nickel alloys all in the "excellent" resistance welding class. We see further that there are only four alloying elements, (1) manganese, (2) zinc, (3) silicon and (4) nickel.

Briefly stated, the rôle these four elements play in the copper alloy as they are related to the development of a high strength, resistance weldable sheet is as follows:

Manganese

This element generally forms a solid solution with copper. Alone with copper, however, it does not make an alloy of any great value. It confers little strength and ductility; at fusion welding heats, it causes the alloy to spit and swell; its oxide is closely clinging and interfering with the metal flow, though, as it is not very refractory, it does not interfere with welding operations as do the refractory oxides of aluminum and beryllium.

In small proportions, usually under 1½%, manganese exerts its greatest benefit on copper alloys as a deoxidizer and desulphurizer. In fusion welding, the manganese oxide tones down the oxides of silicon and copper to make a low melting, flux-like glass which spreads over the molten metal in a transparent impervious film protecting it from the hot gases and further oxidization.

In resistance welding manganese helps very little. It depresses the electrical and thermal conductivity of the alloy, of course, but not as much as do some other elements, as, for instance, silicon and phosphorous. However, it offers no handicap

and it is beneficial as a deoxidizer, as was pointed out above.

Zinc

Without a doubt, zinc is the most important alloying element of copper, making as it does the series of brasses with their great variety of properties useful and beautiful. Zinc deoxidizes the copper, strengthens and in certain proportions, improves the ductility and resilience.

The brasses have melting points lower than that of copper, and in fusion welding they flow freely, with a bright surface. The one shortcoming of the brasses is due to the high volatility of the zinc. Pure zinc melts at 786° F. and boils at 1706° F. Alloyed with copper, its tendency to vaporize is somewhat damped, but increases rapidly when the brass is heated above its melting point. Immediately the vapor is free of the surface of the molten metal it burns to the familiar white oxide of zinc.

Under the direct action of the electric arc, the vapor pressure of the zinc is so great and the obscuring action of the resulting zinc oxide smoke so bad as to make welding of the brasses by these processes practically impossible. With the oxy-acetylene torch the temperature of the molten metal can be kept down and, consequently, the volatilization of the zinc greatly reduced or suppressed entirely.

In resistance welding, the zinc helps cut the electrical and thermal conductivity of the brasses down to where the sheet can be welded by these methods. It does not, however, act as fast as could be desired in this direction. Thus the red brass 80% carrying 20% zinc (and in a larger measure the 15% zinc red brass or the 10% zinc commercial bronze), which is an excellent alloy for many corrosion-resisting and architectural purposes is still too high in heat and electrical conductivity to admit of its being welded with anything smaller than a 150 kva. machine. The common brasses with higher zinc contents are, as far as capacity of welding machines goes, much easier to weld than the low zinc brasses. With still higher percentages of zinc, as in the muntz metals and tobin bronze, the usual resistance welding transformers have sufficient capacity, but trouble is encountered on account of the tendency of the cooper electrodes to "pick up" metal from the sheet, with considerable loss of time in re-dressing or changing electrodes.

The volatility of the zinc is also an occasional source of trouble in resistance welding. Normally the brass will weld under the spot electrodes or wheels without appreciable zinc vaporization. But if there is even a slight change in the welding conditions as, for instance, a bit of scale or dirt on the electrode or between the sheets, the electrical-heat energy vaporizes the zinc momentarily, resulting in a hole in the sheets or a burnt spot on the electrode which will require re-dressing. With the 150 kva.

(*Continued on page* 102)

Table 1—Properties of Copper Alloys

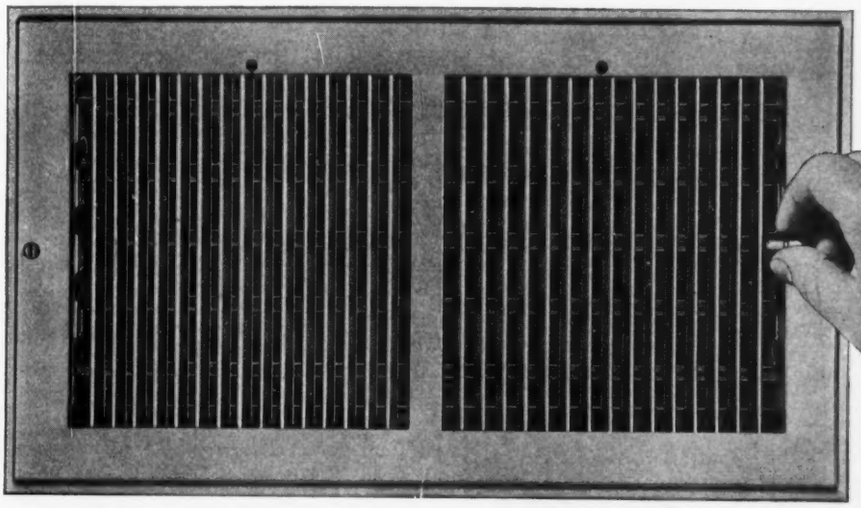
Name	Approximate Composition* %		Melting Point		Conductivity		Tensile Strength PSI		Resistance Weldability
			Deg C.	Deg. F	Elec. %	Heat[a]		Cold	
	Mn	Si			I.A.C.S.		Soft	Rolled	Rating
Everdur A	1	3	1019	1866	6.7	0.08	56000	90000	A
	Zinc								
Everdur 1040	1	3	1020△	1868△	7.9	0.09△	56000	85000	A
Everdur 1027	...	...	995△	1823△	14.3	0.16△	56000	85000	A
		Nickel							
Supernickel	...	30	1225	2237	4.8	0.07	60000	90000	A
Ambrac A	5	20	1150	2102	6.2	0.09	50000	85000	A
Nickel-Silver A	20	18	1110	2030	5.9	0.08	58000	90000	A
	Al								
5% Al Bz	5	...	1060	1940	17.7	0.18	52000	90000	B
8% Al Bz	8	...	1040	1904	14.8	0.16	60000	100000	B
	Be								
Beryllium Cu	1.5	0.5	915	1679	17	...	70000	118000	B
Beryllium Cu Heat Treated	1.5	0.5	915	1679	23	0.20	.....	180000	B
	Zinc								
Red Brass 80	20	...	1000	1832	32	0.34	43000	80000	B
	Tin								
Coe Bronze	...	10.5	1000	1832	10.6	0.12	60000	100000	B
2:1 Brass	34	...	920	1688	26.0	0.29	46000	70000	B
Muntz Metal	40	...	905	1661	28.6	0.30	55000	.....	C
Tobin Bronze	40	0.75	885	1625	25.0	0.28	54000	75000	C
Red Brass 85	15	...	1020	1868	37.0	0.38	42000	70000	C
Commercial Bronze	10	...	1045	1913	41.0	0.45	37000	65000	D
	Phos.	Oxygen							
Deoxidized Copper	Trace	0.00	1083	1981	85	...	33000	50000	D
Copper	...	0.05	1083	1981	100	0.92	32000	50000	D

* Copper remainder in each case.
[a] Cal./cm.²/cm./sec./deg C.
△ Estimated.

U. S. MEETS EVERY EMERGENCY

The NEW 200 LINE —for Our JOBBERS and DEALERS

where Multi-Louver Adjustable-Bar AIR-CONDITIONING REGISTERS Are Specified and Required. A SENSIBLE LINE for a PARTICULAR PURPOSE.



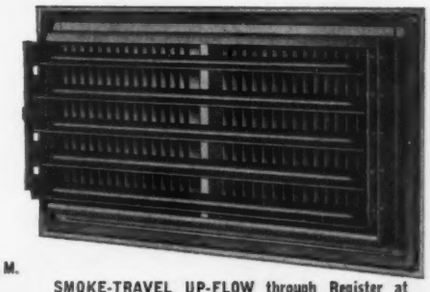
STYLE NO. 249—WITH SIDE-LEVER OPERATED BACK-BLADES that Direct the AIR-FLOW from ANY DESIRED DEGREE of UP-FLOW to any DEGREE of DOWN-FLOW to 45° RIGHT-FLOW With A FULL COVERAGE of GRILLE AREA by the AIR-STREAM.

The VERTICAL (Key-Pin Operated) ADJUSTABLE BAR Grille Design Achieves ANY Degree of Side-Flow Adjustment From 45° LEFT-FLOW to 45° RIGHT-FLOW or any Degree of TWO-WAY FLOW to 45° RIGHT- and LEFT-FLOW.

Sturdy—Mechanically Perfect — SENSIBLY CONSTRUCTED, EASILY OPERATED, and NOT A "TRICK" REGISTER

This REAR VIEW of the No. 249 U. S. AIR-CONDITIONING REGISTER Shows the Sturdiness and POWER of its Construction and Operating Mechanism.

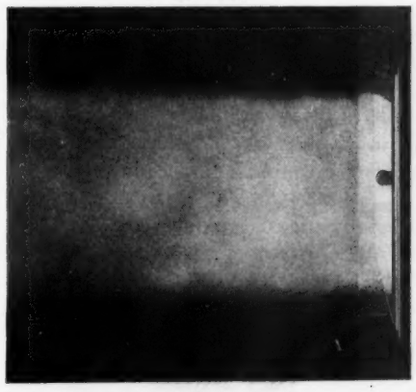
NO PUZZLING FEATURES to Develop Trouble. JUST an UNDERSTANDABLE REGISTER—THAT DOES A REAL JOB.



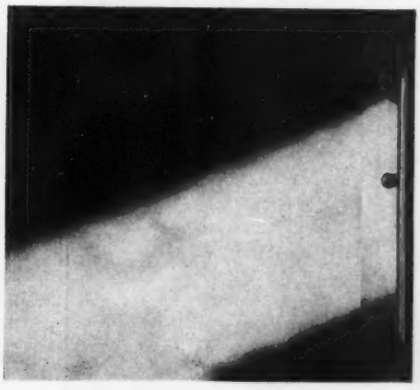
CANDID CAMERA SHOTS Can Only Tell the Truth

Note the FULL GRILLE COVERAGE

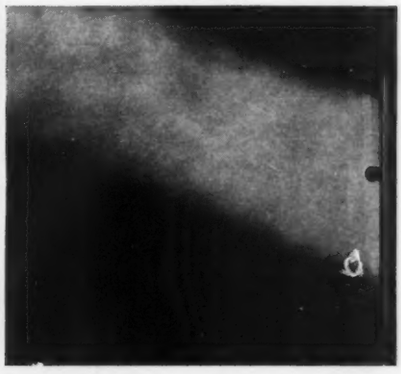
Showing SMOKE-TRAVEL STRAIGHT through Register at 450 F.P.M.



SMOKE-TRAVEL DOWN-FLOW through Register at 450 F. P. M.



SMOKE-TRAVEL UP-FLOW through Register at 450 F.P.M.



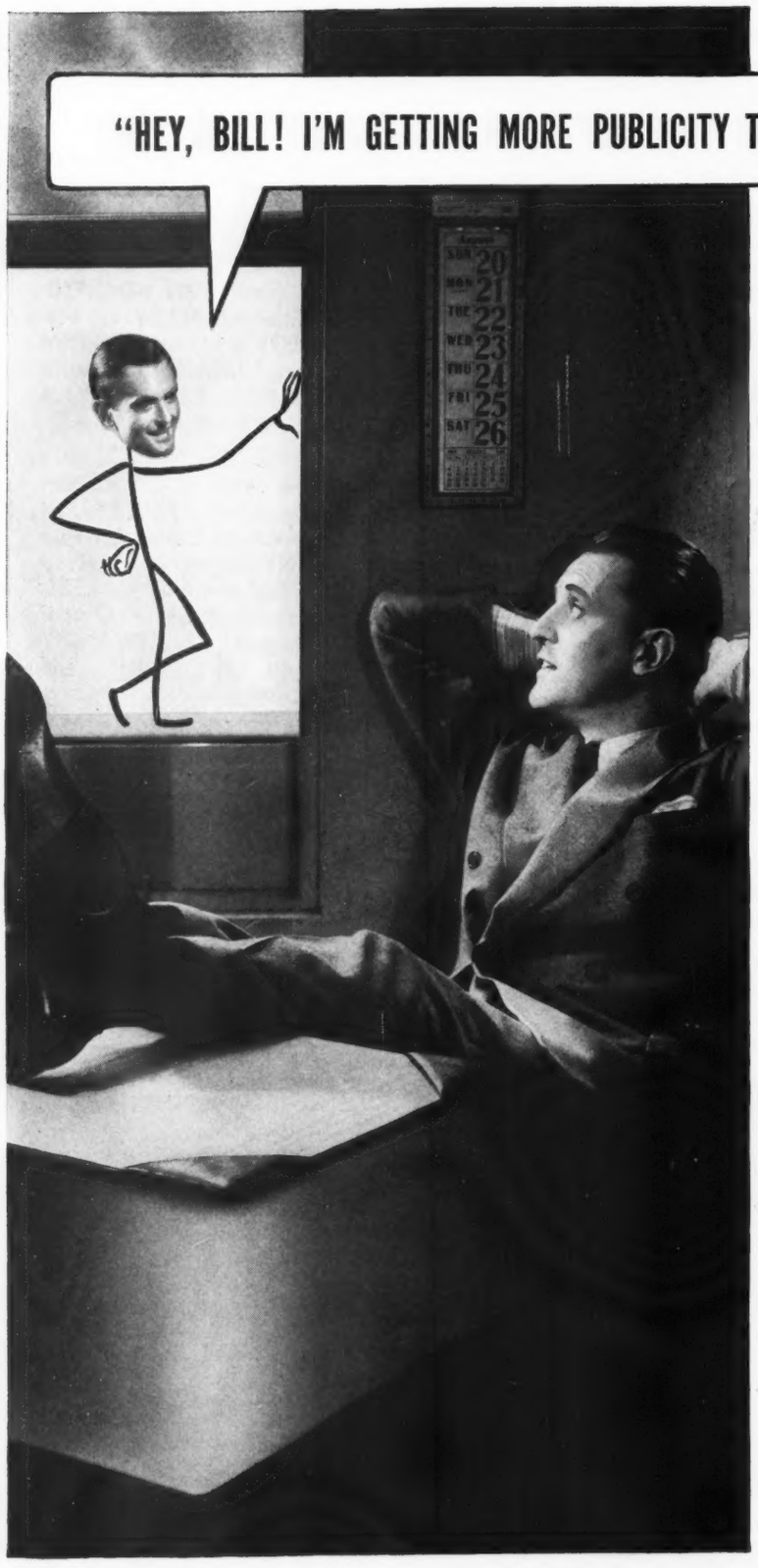
WRITE YOUR JOBBER or OUR NEAREST OFFICE for Latest Information and Prices. We do not recommend that the 200 Line supplant our other lines. IT IS produced to Supply a Demand for this Type of Construction.

UNITED STATES REGISTER CO.

BATTLE CREEK, MICHIGAN

MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.

Manufacturers of AIR-CONDITIONING and GRAVITY REGISTERS and GRILLES



BILL: Who cares? I don't.

LITTLE GUY: You should. I'm going to help you put over one of the most profitable items you ever had.

BILL: I'm all ears. What is it?

LITTLE GUY: Fiberglas Dust-Stop air filters for forced warm-air furnaces.

BILL: But that stuff is chicken feed, isn't it?

LITTLE GUY: Chicken feed, my arm! There's more than a dollar of profit in Dust-Stops *every* year from practically *every* man who owns a forced warm-air furnace equipped with filters.

BILL: You mean there *would be* if folks knew they had to change 'em.

LITTLE GUY: I mean *there is*. For I'm in the magazines now telling these people how necessary filter-changing is, as well as boosting the advantages of warm-air heat.

BILL: What magazines are you in?

LITTLE GUY: The ones home owners read—American Home, Better Homes and Gardens, Life, and the Saturday Evening Post. These magazines have more than 38 million readers!

BILL: Holy smokes, I better get busy!

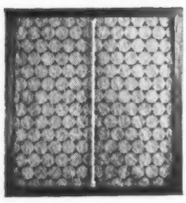
LITTLE GUY: I'll say. Beginning right now, you ought to phone everybody you know who owns a forced warm-air furnace in this town.

BILL: Got any other suggestions?

LITTLE GUY: Yep. Mail every prospect the free postcards the Dust-Stop people have for you.

BILL: Swell! Got any other good advice?

LITTLE GUY: That's all, except GET GOING! If you don't, your competitor will beat you to the gun!



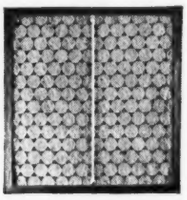
You can make a lot of extra money this year on

FIBERGLAS* DUSTOP* AIR FILTERS

ST. M. REG. U. S. PAT. OFF.

Manufactured by Owens-Corning Fiberglas Corporation, Toledo, Ohio

See Fiberglas at the Fairs—New York and San Francisco



Fan Manufacturers Meet

The summer meeting of the National Association of Fan Manufacturers was held at Manchester, Vermont, on September 14, 15, 16, 1939.

◆

Somers on Codes Committee

W. S. Somers of Lammeck Products, Inc., Columbus, Ohio, has been appointed as a member of the Installation Codes Committee of the National Warm Air Heating and Air Conditioning Association.

◆

Fox Valley

A regular meeting of the Fox Valley Furnace and Sheet Metal Contractors Association was held at Bobbitt's Cafeteria, 10 Main Street, Aurora, Illinois, on August 21. Dinner, cafeteria style at 6:30 p. m., with the business meeting at 7:30, and a good attendance.

Art Meiche continued his lecture on heating. He outlined in detail a series of charts in furnace estimating which members found very helpful and interesting.

George J. Bushman, Secretary.

◆

Standard Code Requirement Forms

The National Warm Air Heating and Air Conditioning Association announces that the former Standard Code Requirement Form for gravity installations has been revised to be in line with the January, 1939, revision of the Standard Code. The blank has been increased from two to four pages and the make-up and printing improved. The prices are:

Lots of 50 .....$1.25
Lots of 100 ..... 2.00
Lots of 500 and over ..... 1.80 per hundred

◆

Toledo Annual

The Toledo Sheet Metal and Roofing Contractors Association, Inc., Toledo, Ohio, representing the sheet metal, gravity and mechanical warm air heating, air conditioning, ventilating and roofing industries, held their annual meeting recently and later a meeting of the Board of Trustees. The following trustees were elected:

Wesley Bueche, president, The Enterprise Roofing Company.
Clarence Christen, vice president, The Fred Christen & Sons Co.
Joseph Dersher, Jos. Dersher Sheet Metal.
Lee B. Faunce, Faunce & Faunce.
Carl W. Schmidlin, Schmidlin Brothers Heating Company.
Roy Sherman, president, The Toledo Roofing Company.
Frank Warnke, president, The Warnke Brothers Company.

The trustees then elected the following officers:

Carl W. Schmidlin, President.
Frank Warnke, Vice President.
Clarence Christen, Treasurer.
Henry C. Bitter, Secretary.

The matter of employing a full-time secretary, discussed at previous meetings, was again discussed and it was resolved to employ the present secretary as Executive Secretary, and that the budget be underwritten to cover the expense of this office for one year, and that his term begin as soon as satisfactory arrangements could be made with his present employer.

Henry C. Bitter, Executive Secretary.

National Convention

The dates of the next big convention of the National Warm Air Heating and Air Conditioning Association are January 22, 23 and 24, 1940, at The Hollenden, Cleveland.

Attendance will be a good business investment.

The Bi-ennial Exhibition, in near-by Lakeside Hall, Cleveland, will be held during the same week. The American Society of Heating and Ventilating Engineers and the American Society of Refrigerator Engineers hold their winter meetings then.

Allen W. Williams, Managing Director

◆

Secretaries' Conference

Subjects suggested for consideration and discussion at the National Secretaries' Conference being held in Milwaukee on Saturday, September 16, are:

The Toledo Plan—Heating Code and Apprentices, by Henry C. Bitter of Toledo.
The Copper Situation, by Clarence J. Meyer of Buffalo.
Work Lost in the Industry.
Buffalo Resolutions on Combustible and Inflammable Materials.
Organization—Consideration of, Discussion and Adoption.
Constitution and By-Laws.

Paul L. Biersach, Secretary.

◆

Furnace Dealers Invited to Membership

The National Warm Air Heating and Air Conditioning Association provides an attractive membership for furnace dealers, and extends a cordial invitation to all progressive and reliable heating contractors to join and share the benefits of membership. This organization points out that this is an easy way to keep continually posted as to just what is going on in the growing furnace industry and affords a direct contact with and an active part in the numerous necessary activities which have been carried on successfully by this Association for over twenty-five years.

The dues of this membership are nominal.

Full information will be gladly furnished by Allen W. Williams, Managing Director of the National Warm Air Heating and Air Conditioning Association, 5 E. Long Street, Columbus, Ohio.

◆

Wisconsin

The Master Sheet Metal, Heating, Ventilating & Air Conditioning Contractors Association of Wisconsin held their monthly meeting at Hamer's Long Pine Cabin Inn on Lake Shawano on August 12.

Thirty were present including a quorum of the Board of Directors—some from LaCrosse, Milwaukee, Fond du Lac, etc. The State association voted to provide a dinner for the Secretaries' Conference, and the members of the State association are invited to attend. Member Zahn reported in the absence of the chairman of the Legislative Committee regarding the drafted bill. A new member—Leonard Schuelke of Waupaca—was accepted.

The next meeting will be held in Milwaukee, and La Crosse was selected for the second Saturday of October.

Thanks and appreciation were extended to Mr. and Mrs. R. F. Gehrke and their daughters for their hospitality, the refreshments, and the splendid entertainment. Dancing was indulged in until late at night.

Paul L. Biersach, Secretary.

For your convenience a number has been assigned each item. Circle the items in which you are interested on the coupon on page 100 and mail to us.

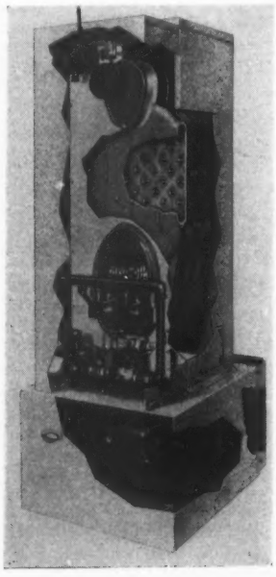
● Indicates product not listed in 1939 Directory.
△ Indicates product and manufacturer not listed in 1939 Directory.

NEW PRODUCTS

157—Sunbeam H Conditioner

American Radiator & Standard Sanitary Corporation, 40 West 40th Street, New York City, announces the new Sunbeam gas-fired air conditioners, series H and HV with a cast-iron heating element designed for use in small and average-size homes.

The HV with return air intake in the bottom is designed for first floor, apartment or closet-type installations. The H is available in 4 sizes for use



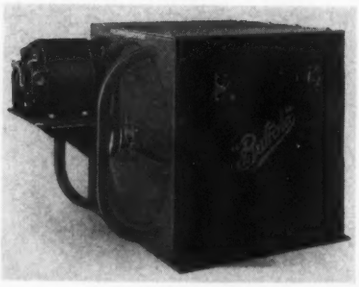
in basement installations—75,000 to 150,000 Btu. input per hour.

Both may be used as floor-type air conditioners by discharging conditioned air through an outlet elbow from the top of the casing.

Exterior cabinet is 20-gauge steel finished in green crystaline baked enamel. Inner casing is of galvanized iron. Specifications include a thermostatic pilot, automatic gas valve, air filters, large blower with motor, pressure regulator, and cast-iron drilled port type burner.

158—Arc Welding Electrode

The Lincoln Electric Company, 12818 Coit Road, Cleveland, announces a new arc welding electrode—Fleetweld 10—which eliminates the need of dressing or smoothing welded seams in many applications. Fleetweld 10 was designed particularly for finish bead welding on "U" groove welding in downhand position.

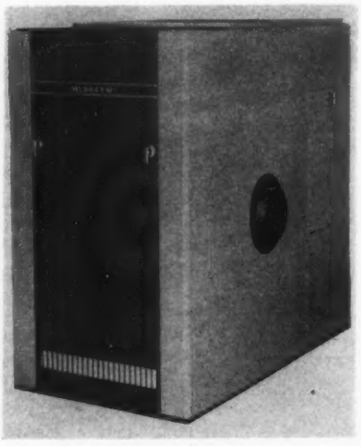


159—"L" Breezo

Buffalo Forge Company, 497 Broadway, Buffalo, announces the new Buffalo "L" Breezo—a propeller-type fan with the motor outside the air stream—suitable for exhausting from paint spray booths, over kitchen and laboratory hoods, in chemical plants or wherever there is an excess of moisture, heat, dust or corrosive fumes. Sizes range from 12 to 36 inches.

160—The Series Fifty

L. J. Mueller Furnace Co., 2005 W. Oklahoma Avenue, Milwaukee, announces a new oil-fired air conditioning furnace—The Series Fifty. Btu capacity at the register is 100,000. Available in only one size but with a choice of fan sizes from 1100 maximum cfm. at ⅛ in. s. p. to 1900 cfm., and without any change in the casing or dimensions.

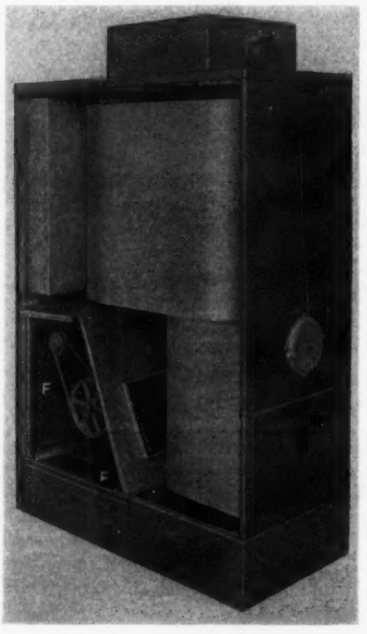


The heating drum and radiator are built of heavy gauge steel, all electric-welded. Flue connection can be on either side, with cleanout opposite. Provision is made for hot water coil. Filters are easily removed, with access to filters, fan and motor on either side.

Heating unit, fan-filter unit, and burner enclosed by green texture-lacquered casing.

161—Utility Series 55

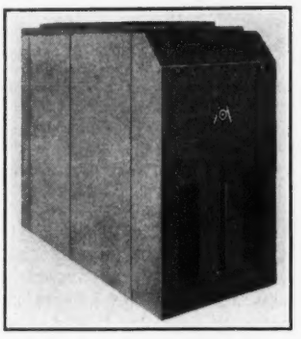
The Henry Furnace & Foundry Company of Cleveland, announces a new oil-fired winter air conditioner, designed particularly to fit the utility room of low-cost houses. This Series 55 "Utility" develops 55,000 Btu. It occupies floor space 21x41 in.; and the



welded steel heating unit presents 4800 sq. in. of heating surface. Vertical flues in the upper section add to the radiating surface. The blower forces air at comparatively high velocities.

162—Convertible Conditioner

The Majestic Company, Huntington, Indiana, announces the 400 series heavy duty steel convertible oil or



gas fired winter air conditioning unit priced for the low cost home—100,000 Btu capacity.

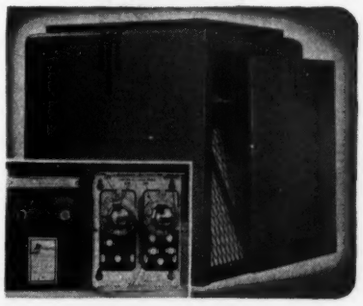
New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 100.

●163—High-Low Conditioner

Viking Air Conditioning Corp., Main & Center St., N. W., Cleveland, announces a new 1939 Model Viking High-Low conditioner and the new High-Low automatic speed control.

With the High-Low automatic speed control, the blower operation begins at low speed when the bonnet becomes



sufficiently warm (approximately 120 deg.), heat is circulated and when the bonnet temperature reaches 165 deg., the blower is automatically switched to high speed, where it remains until the temperature drops to 145 deg. The blower then goes back to low speed and the temperature falls to 120 deg.

Special weather-stripped filters (felt lined) are used. Special clamps hold the filters tight against the frame. Rubber blower mountings and insulation between blower and cabinet provide quiet operation and eliminate vibration; High-Low motor and self-adjusting motor base.

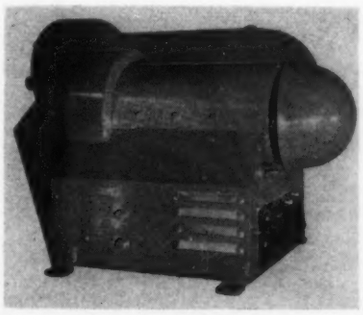
◆

164—Burner Lights Electrically

The Silent Glow Oil Burner Corporation, Hartford, Conn., offers a new oil-electric range burner which

lights electrically by touching a push button.

Push-button lighting is obtained by means of a vibrator coil and dry cells.



165—Shield-Arc Junior

The Lincoln Electric Company, 12818 Coit Road, Cleveland, announces a new small arc welding machine, the Shield-Arc Junior, for use in conjunction with an engine or electric motor drive. Dual continuous control of voltage and current permits independent adjustment of voltage and current. The machine occupies a space less than 2 feet square.

◆

166—Flue Gas Analyzer

The Hays Corporation, Michigan City, Indiana, announces a new Orsatomat or automatic flue gas analyzer.

The greatest change is in the tilting analyzing unit now composed of a transparent plastic instead of hard rub-

ber. The new unit is housed in a newly designed streamlined, pressed steel case along with a draft measuring and indicating unit. Both analyzing and indicating units are removable. A flue gas thermometer may also be had to fit inside the case.

A two-unit model, with draft measuring unit and flue gas thermometer, for analyzing for CO_2 and O_2 is also to be had.

◆

●167—Air Filter Gauge

Air Conditioning Supply Co., 4060 Superior Ave., Cleveland, announces the A. C. S. air filter gauge for determining small air or gas pressures.

The body is of cast semi-steel, there is a heavy wall Pyrex glass tube protected against breakage on three sides by the gauge casting, and the scale (graduated in tenths to read 0 to .5 inch) is mounted directly behind the glass tube in the recess of the casting. Finish is baked dull black Japan.

The gauge contains two hose nipples. Included are a bottle of red indicator oil and a dropper for filling the gauge.

◆

▲168—Sanding — Rubbing — Polishing

The Detroit Surfacing Machine Company, 7433 West Davison, Detroit, is introducing the Easy electric sander, a portable all-electric reciprocating motion sanding, rubbing and polishing machine.

The sander is adaptable to new and

refinishing applications on flat, curved and irregular surfaces—from fine precision work to rough castings.

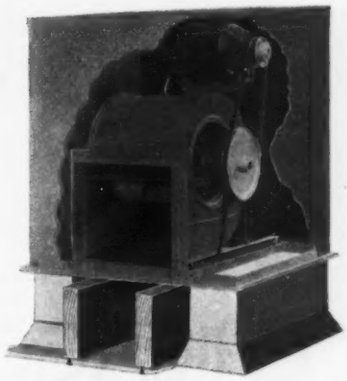
Weight 6¼ pounds, comfortable grip, convenient switch control.

Powered by Universal motor, operating from A.C. or D.C. electric light socket.

◆

●169—Attic Ventilating Blower

F. Jaden Manufacturing Co., Inc., Hastings, Nebraska, announces the



Golden Rod Attic Ventilating blower in six sizes for ventilating spaces from 11,000 to 230,000 cu. ft.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 100.

170—Rudisteel and Rudico

The Rudy Furnace Company, Dowagiac, Michigan, announces a new steel coal-heat winter air conditioner as an addition to its line of cast iron and steel forced air and gravity equipment. The new units are available in two price ranges and are sold under the trade names "Rudisteel" and "Rudico."

Rudisteel units are enclosed in Rudy baked green satin krack enamel casings and are equipped with standard Rudy blowers. Vaporator humidifier is optional equipment.

Rudico units are smaller in size, competitively priced, and have single flue outlets. A triple layer asbestos liner replaces steel baffles.

◆

171—Gas Comfortzone

Michigan Tank & Furnace Corp., 14101 Prairie Ave., Detroit, announces the Comfortzone winter air conditioning furnace, gas fired, in two sizes 63,000 and 90,000 Btu at the register.

Standard equipment includes burner (including gas valve, pressure regulator, automatic pilot, pilot shut-off cock, main gas shut-off cock), transformer, thermostat, combustion compartment, radiator, draft diverter, outer casing of furniture steel in green crinkle finish, combination limit and fan switch, renewable fireproof filters, blower and automatic humidifier.

◆

172—Microstat

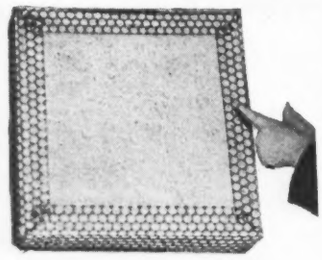
Julien P. Friez & Sons, 4 N. Central Ave., Baltimore, Md., announces a new low-priced thermostat for low voltage control (25 v. 2 amperes maximum) of heating or cooling equipment.

The case is attractive and well ventilated (3½x1½x1½ in.) with a builtin thermometer. The switch mechanism is suspended from a single point and features "Alnico" magnets, heat-treated bimetals, and gold contacts.

TAMPICO ● the one Filter you don't have to handle with Kid Gloves

★ We recommend tamping of filters by the home owner once a month, knowing that this will keep up the efficiency of your furnace job and eliminate many service calls.

Tampico filters are built to stand up under tamping every month. You will find this a feature which will make profitable replacement filter sales easier.

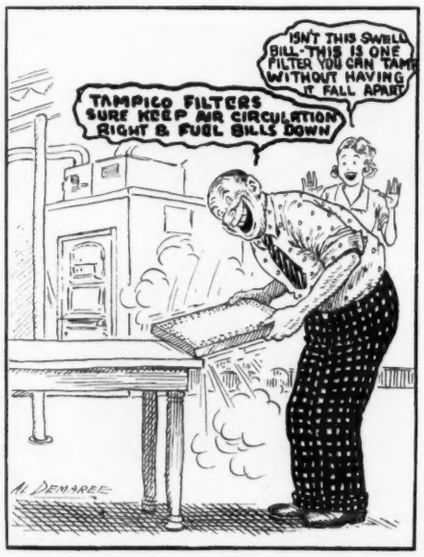


The Public Demands a Filter which can be tamped at least 12 times Per Year. In other words the public refuses to buy filters every few months. Equip your air conditioning units with TAMPICO filters to meet these requirements.

The Air-Free TAMPICO Filter shown here is the DeLuxe filter in our line because of its unique air-free, rigid frame, made from die cut metal. Does its filtering job with no objectionable high velocity noises or whistles, which occur when the air by-passes a solid frame. Also available in frameless style and with cardboard frame.

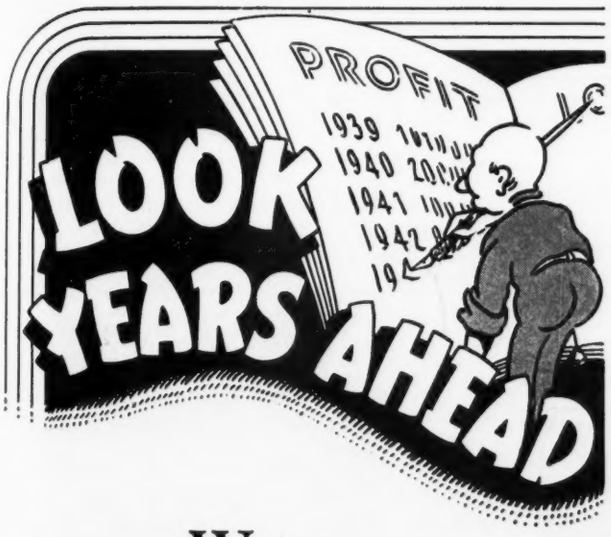
Efficient, odorless, flameproof, and are built with a natural filter medium especially for warm air heating and air conditioning work.

Send for Literature Today


ISN'T THIS SWELL BILL-THIS IS ONE FILTER YOU CAN TAMP WITHOUT HAVING IT FALL APART
TAMPICO FILTERS SURE KEEP AIR CIRCULATION RIGHT & FUEL BILLS DOWN
M. DEMAREE

CHICAGO FILTER CO.

« « JOLIET, ILL. » »



When buying automatic controls for heating and air conditioning, it is important that you take into consideration the question of the operating life of a control.

Years of trouble-free control performance is largely dependent upon the type and make of the actuating element used in the control.

If the temperature actuating element in the control is of a type that may be subject to leaks or an element that may "creep," the control soon ceases to function properly.

This cannot happen in controls equipped with Chace High Temperature Bimetal, because it represents a new achievement in the development of bimetals that will outlast the entire heating unit itself. It offers unvaried action, even at excessive temperatures. Its precision is exact—year in and year out—its movement always remains the same.

The slightest shift or variation in the actuating element of a temperature control may seriously impair its operation. All such inherent defects make disgruntled customers and create needless service expense. You can protect your interests by selecting controls equipped with Chace High Temperature Bimetals. They represent a stamp of quality.

Buying wisely is looking ahead.

Control manufacturers are invited to consult us regarding the type of Chace Thermostatic Bimetal best suited to meet specific demands.

W.M.CHACE CO.
1601 Beard Ave., DETROIT, MICHIGAN

Value Priced

FOR GREATER MARGINS
ENGINEERED FOR BETTER SERVICE

usAIRco BLOWER-FILTER PACKAGE UNIT

5 SIZES FROM 1000 C.F.M. TO 6000 C.F.M.

DEALER PRICE 1000 C.F.M. UNIT $40.50
Less Furnacestat

DEALERS · JOBBERS · MANUFACTURERS
WRITE FOR CATALOGS · PRICES · DISCOUNTS

usAIRco BLOWER-FILTER UNITS are complete with blower, drive, filters, G. E. motors, Minneapolis-Honeywell furnacestat. 17 years of successful experience has developed **usAIRco** Units which are quiet, dependable, efficient. Completely guaranteed in every detail of construction and performance. **usAIRco** offers an outstanding value at new low prices — a value that is the result of competent engineering, efficient production and low operating overhead. Write today for catalogs, prices and discounts.

usAIRco also offers a wide selection of Double Inlet Blower Assemblies, with or without drive and motor — also Blower Wheels and Scroll Housings.

usAIRco Air Conditioning Equipment

INFORMATION CARD

United States Air Conditioning Corp. AA-1039
Northwestern Terminal
Minneapolis, Minnesota

If you have a bigger value at a better price, we want all the details. Send us complete information.

☐ Blower-Filter Package Units ☐ Furnace-Blower Assemblies
☐ Wheels and Scroll Housings

Name_____

Address_____

Town_____ State_____

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 100.

△ 173—Rivet Setter

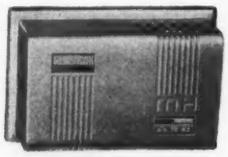
Tubular Rivet & Stud Company, Wollaston, Massachusetts, has recently introduced an improved line of motorized automatic rivet setting machines.

These rivet setting machines are leased and include models of different styles.

Manufacturers may submit a specimen assembly for recommendations.

174—Grad-U-Stat

The Minneapolis-Honeywell Regulator Company, 2950 Fourth Avenue South, Minneapolis—Pneumatic Controls Division—has developed a new pneumatic thermostat, the T0900 Grad-U-Stat, available for either duct or wall mounting.

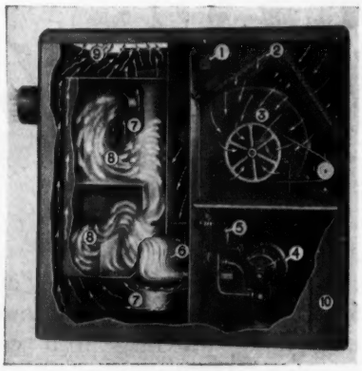


The cover is modern and pleasing in appearance—styled by Henry Dreyfus.

The horizontal mounting of the Grad-U-Stat provides for free flow of air over the low-mass super-sensitive bellows, except for the grill work in the cover. A single model may be used as a direct or reverse acting thermostat and the throttling range of differential may be adjusted between comparatively wide limits. Sub-Master, Day-Night, and Summer-Winter models are available through the addition of a small unit to the standard Grad-U-Stat, and the Day-Night thermostat requires only two air lines.

●175—The Master

The Peerless Foundry Company, Indianapolis, Indiana, has just introduced a series of new, compact and attractive cabinet type oil or gas-burning furnaces complete with blower, filters and automatic humidifier.

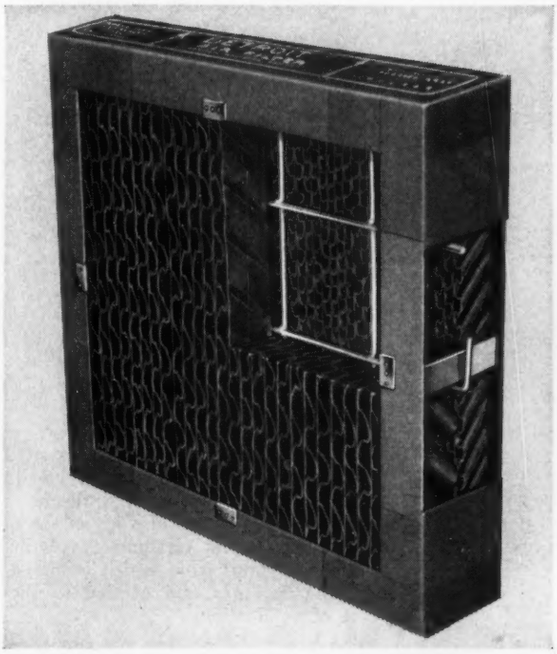


The new unit, known as "The Master," is encased in a baked enamel cabinet. Combustion chamber is heavy rolled steel with pre-cast refractory and two outlets to the radiator. Radiator is well baffled.

Btu. capacity at registere is 80,000 to 130,000 for oil, and 74,000 to 100,000 for gas.

You're Passing Up A Real Bet If You Don't Act NOW!
HESS
OFFERS YOU A COMPLETE LINE AND EXCLUSIVE TERRITORY
Break down your customers' sales resistance by offering them America's finest welded steel furnaces . . . all sizes up to a million B.T.U. capacity. The Hess line includes blower filter units of unsurpassed quality and performance, also oil burners and stokers to fill every dealer requirement. You'll profit by doing business with responsible source of supply established since 1873.
Free! Dealer Portfolio Complete Details and Sales Helps!
HESS WELDED STEEL FURNACE
An extraordinary furnace; rectangular throughout; firebox lined with 2½" refractory; double casings and many other advantages offering greater efficiency cleanliness, durability and economy.
HESS
WARMING AND VENTILATING CO.
Established 1873
1211-27 S. WESTERN AVE.
CHICAGO, ILL.

MORE SERVICE FROM AIR FILTERS



The Detroit Air Filter (formerly the Arco Filter) is built in such a way that its entire depth is effective in air cleaning and its cleaning efficiency actually increases in service instead of diminishing. • At the same time, its very low initial air resistance increases at a slower rate than filters of other design because the entire filter area remains effective in service—no spot clogging, no disintegration. • The Detroit Filter is easier to handle because it is fully reinforced with metal—it will not sag or break apart. • Extremes in temperature (from zero to 180°) do not interfere with filtering efficiency. • This filter is not an expensive unit—in fact it costs less than many filters of this class and no more than the others, in spite of its greater effectiveness.

Write for descriptive bulletin

DETROIT LUBRICATOR COMPANY

General Offices: **DETROIT, MICHIGAN**

Canadian Representatives: RAILWAY AND ENGINEERING SPECIALTIES LIMITED

Montreal • Toronto • Winnipeg

Now is the time to . . .
REPLACE DIRTY FILTERS
Now is the time to install
HUMIDIFIERS and CONTROLS
ON YOUR
WARM AIR HEATING SYSTEM
This sign is your guide to the Warm Air Heating Contractor who will tell you why.

THERMO-DRIP WILL HELP

YOU GET QUICK ACTION IN THIS BIG CAMPAIGN TO PROMOTE WARM AIR HEAT

It's the talk of the industry, this nation-wide newspaper campaign to stimulate warm air heating business this fall. And when this campaign reminds your customers specifically that "Now is the time to install Humidifiers . . ." count on your jobber and us to help you get your share of this profitable business.

Send for FREE Selling Helps

You'll find it easier and more effective to "tell them why" with a THERMO-DRIP dealer's catalog in your file . . . with folders that carry a powerful sales message to your prospects . . . with window strips to beckon passersby . . . with newspaper mats. They're yours for the asking. Send for them.

AUTOMATIC HUMIDIFIER CO.

18th and Main Streets CEDAR FALLS, IOWA

Fill in this coupon (or simply pin it to your Letterhead) and mail TODAY. No obligation!

AUTOMATIC HUMIDIFIER CO., 18th & Main Sts., Cedar Falls, Iowa

We want to tie in with the big warm air heating campaign. Send us selling helps on Thermo-Drip Humidifiers as checked.

- ☐ Catalog and Price List
- ☐ Envelope Enclosures or Folders
- ☐ Window Strips
- ☐ Newspaper Mats

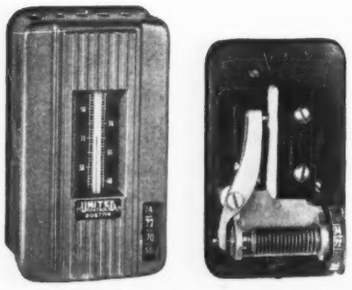
Name .....

Street .....

City ..... State.....

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 100.



176—Temperature and Limit Controls

United Electric Controls Company, 69 A Street, Boston, Massachusetts, announces new temperature and limit controls for unit heaters and furnaces:

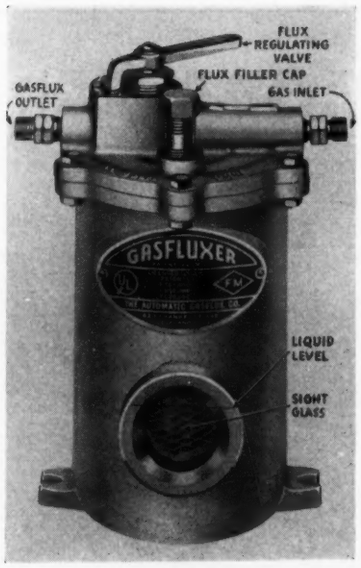
Model 11U thermostat is a 2-wire line voltage direct control for unit heaters and also for motor or solenoid steam valves. A thermal element of extreme sensitivity, but exerting a positive hydraulic force, actuates a snap acting, fully enclosed, silver contact Micro switch. The control can be wall mounted or suspended on a length of conduit under the furnace.

Model 11UL has tamper-proof, cast aluminum protection cover.

177—Air Conditioning Relay

The Mercoid Corporation, 4201 Belmont Avenue, Chicago, announces a new air conditioning relay—Type V2-105-590—designed especially for use on air conditioning installations where it

is desirable to control the circulating fan from room temperatures during both winter and summer. A builtin toggle switch projects through the cover and positions are marked "Winter" and "Summer."



178—All-Metal Fluxers

The Automatic Gasflux Company, 700 Public Square Building, Cleveland, announces a line of improved all-metal Fluxers or dispensers of various sizes. Also, a new liquid Gasflux—a volatile liquid—the vapor from which is mixed with the fuel gas and carried to the point of application.

The automatic gasflux process uses standard torches and tips.

A graduated flux regulating valve adjusts the volume of flux to gas.

Dealers!

***8 out of 10 hand-fired domestic heating plants are NOT now equipped with temperature controls of any kind.**

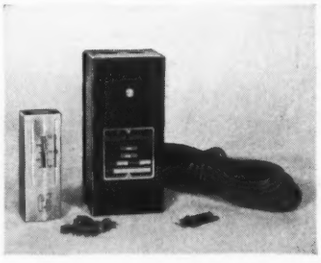
***80% of Hand-Fired Heating Plants**

are your prospects for the

NEW G-A LOW COST TEMPERATURE CONTROL

Complete with all accessories, the No. 118 G-A Temperature Control System includes G-A single thermostat and G-A control motor. For 110 volt, 60 cycle A. C. (other voltages and frequencies available).
List Price $19.00

G-A Single Relay Control No. 107. The ideal set for the thermostatic control of unit heaters, circulating pumps and other similar jobs of 110 volt load. Each package contains G-A single thermostat, transformer-relay and accessories. For 110 volt, 60 cycle A. C. only.
List Price $10.75



The Gleason-Avery Temperature Control Package Unit is *especially priced* to interest the 5 million owners of hand-fired heating installations who still have no temperature control system of any kind. Cash in on this wide-open market!

Sell them the compact, low-cost, high quality G-A Temperature Control Package Unit. It provides all of the sensitivity and dependability which have made the name Gleason-Avery famous in the temperature control world. It has been carefully designed by engineers to give trouble-free operation under all types of operating conditions—and a long life of satisfactory service. That's why you'll sell MORE of these New G-A Control Package Units.

And, best of all, the G-A Temperature Control Package Unit gives you a BIGGER PROFIT PER SALE!

Send for COMPLETE Information

You can make more money selling this New G-A Temperature Control Package Unit. Write for the special dealer proposition RIGHT AWAY! We'll also send you catalog of complete G-A line—**including control motors, limit switches, relays, time switches, stoker controls, etc.,** as well as the name of your nearest jobber!

DISTRICT REPRESENTATIVES

The H. M. Flemming Co., Inc.
30 Church Street
New York City

New England Representative
Smith & Dale
457 Stuart Street
Boston, Massachusetts

Mr. Floyd T. Whitney
5736—12th Street
Detroit, Michigan

Mr. Fred W. Forward
520 West Boulevard
Elkhart, Indiana

GLEASON-AVERY, Inc.
26 Clark Street **Auburn, New York**

The GALE "Seal-Tite" REGISTER

Eliminates Wall-Streaking!

10 Advantages for You

1. Permanently streak-proof with "Seal-Tite" exclusive flexible packing construction.
2. A complete unit that cuts installation costs.
3. No sealing frames needed when roughing in.
4. Directed air flow for comfort—no drafts.
5. Wide face area gives maximum capacity.
6. No visibility through register at chair height.
7. Easy to paint and clean.
8. High quality at a low price.
9. Attractive discounts increase your profits.
10. Baseboard and sidewall types. Sizes: 4"—5"—6"—8"—10" heights. 8"—10"—12"—14"—24"—30" widths. Other sizes made up special.

ASK YOUR JOBBER or write us direct for catalog on GALE Registers and "Pre-Fabricated" Ducts and Fittings.

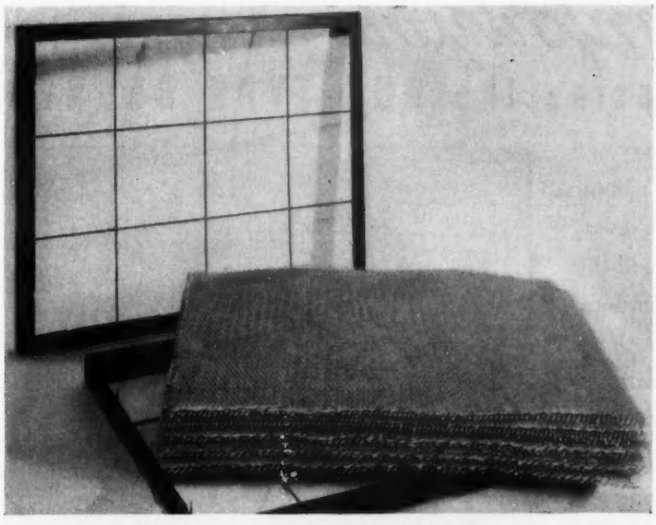
GALE "Pre-Fabricated" DUCTS and FITTINGS

The standardized sizes of Gale Pre-Fabricated Ducts and Fittings cut installation costs tremendously. Our fittings automatically take care of the engineering for you. The Gale Quick-Method Chart gives accurate sizes for any job, and figures costs for you. Our Drafting Department will gladly make your plans free of all charges.

CHAR-GALE MFG. CO. 3125 Hiawatha Ave. Minneapolis, Minn.

RESEARCH PRODUCTS CORPORATION

Walton *Re-Fil-Able* Air Filters



Mean Repeat Business

Yes, and when you install them for your customers you are doing them a great service both mechanically and financially. . . . For Research Products Corp. "Walton Air Filters" operate most efficiently in dust removal . . . have low resistance to air flow, and will cost less. This new unit which consists of a permanent steel frame with removable cover and replaceable trisection filter will effect efficiency and economy in air conditioning systems that will gladden the hearts of your customers. It will also open the door to additional profits for you with its replacement feature. For you will get all this business automatically. Get set for the season with Research Products Corp. "Walton Re-Fil-Able Filters" Now. . . . Write or full information.

RESEARCH PRODUCTS CORPORATION

MADISON WISCONSIN • Manufacturers of--

- **R-P ZEOLITE** — High capacity, long lasting, low cost mineral for softening water.
- **FILTERAG** — An efficient filter medium for filtering water and liquids.
- **ALKALEX** — A carbonaceous cationic exchanger for removing alkalinity from water.
- **BIRM** — The effective, inexpensive mineral for removing iron from water.
- **AIR-FILTERS** — Made of expanded fibre, high dirt removal efficiency, low resistance to air flow.

With the Manufacturers . .

Merchandising Plan Tells Story

Cook Electric Company, 2700 Southport Avenue, Chicago, will shortly broadcast a merchandising plan for their new No. 400 heat control to furnace and sheet metal contractors. The plan includes consumer folders that quickly and forcefully tell the story.

◆

Maurey Has New Offices

Maurey Mfg. Corp., 2915 S. Wabash Avenue, Chicago, manufacturers of pulleys—fan and motor—has moved into new completely air conditioned offices at the same location. The factory addition gives them a 30 percent increase in manufacturing space.

◆

Rowell Joins Marion Furnace

I. W. Rowell, recently general representative of Air Controls, Inc., has accepted the position as president and general manager of Marion Furnace Co., 2970 West Grand Blvd., Detroit.

Marion Furnace Company manufactures a line of oil and gas steel furnaces, to which later will be added coal furnaces.

◆

Frederick E. Hartmann Dies

Frederick E. Hartmann, 54, general sales manager of the Baker Ice Machine Company, was found dead in bed August 7th, in his Omaha home. A senior member of the American Society of Refrigeration Engineers, he contributed many articles to engineering magazines. He was a member of the Omaha Engineers Club.

Hartmann joined the Baker Ice Machine Company as a mechanic in 1905, a year after it was organized. He has been general sales manager for the last six years. Before that he was district sales manager. During the world war he was a chief engineer in the merchant marine.

Masonic funeral services were conducted August 10th. Burial was in Forest Lawn Cemetery, Omaha. Mr. Hartmann is survived by his wife.

◆

Grant Wilson Is Cheney Distributor

Grant Wilson, Incorporated, 4101 West Taylor Street, Chicago, has completed arrangements with the Cheney Company, to become exclusive middlewest distributor of the Cheney Royal Pipe Covering Protector, an aluminum formed protector to be applied on the ends of sectional pipe covering, safeguarding it against abuse, damage and deterioration.

◆

Osborn Purchases Globe Ventilator Co.

The J. M. & L. A. Osborn Co., announces the purchase of the business of the Globe Ventilator Co. which was established at Troy, N. Y., in 1876. This includes the trademarked Globe name and good-will; as well as their warehouse stocks, dies and machinery.

Osborn will continue the manufacture of Globe Ventilators in a full range of sizes, retaining the Globe name and marketing policy. All manufacturing operations will be conducted at Osborn's Cleveland plant.

◆

New Control Manufacturer

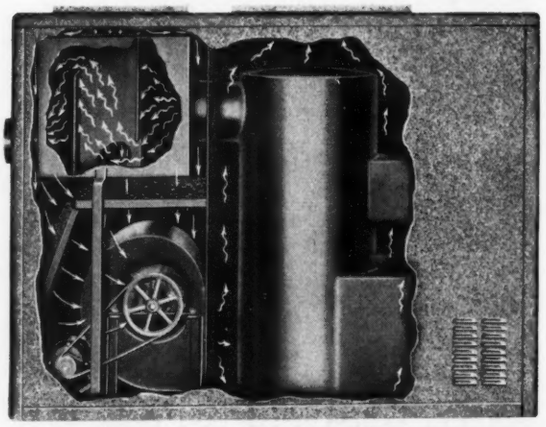
The Magnet Switch Company, 356 West Huron Street, Chicago, has been organized by Tom Russell Jr., in cooperation with his father T. C. Russell, who was formerly president of the Russell Electric Company.

The Magnet Switch Company will manufacture magnetic switches, automatic temperature controls, and kindred devices. Development and testing work have been carried on for nearly a year. The first products, which will be offered shortly, will consist of a room thermostat, a new type of damper motor, and an automatic stack draft control.

Help yourself to More **PROFITS**

● **with this** *Comfortzone* **DESIGNED for the SMALL HOME using the GUN-TYPE BURNER**

● If you want to increase your profits this coming season, you'll have to sell the small home builders. They represent the volume market, which means increased sales and profits for every furnace dealer that can reach them. To better help you sell this small home market, The Michigan Tank and Furnace Corporation has designed the Comfortzone M-85 and M-100. Both are sturdy and compact automatic oil-burning, winter air-conditioning units that use the gun-type burner. With these Models, the small home owners get all the advantages of larger and more expensive furnaces, and because they cost so little to operate, they have become popular with owners and builders throughout the country. Why not let us tell you more about the Comfortzone M-85 and M-100, a letter from you will bring prices and details.



● A cross-section view of the M-models shows details of heat and air passages. M-85 delivers 85,000 B.T.U. at register. The M-100 delivers 100,000 B.T.U. at register. M-85 houses the burner by extending sides of casing 19" beyond front of furnace. M-100 has 19" vestibule to encase the burner.

AMERICA'S FINEST FURNACES

MICHIGAN TANK & FURNACE CORPORATION

14101 PRAIRIE AVE. • • • DETROIT, MICH

LIGHTNESS plus
STRENGTH

AIROTOR
TRADE MARK REGISTERED
Blower Wheels

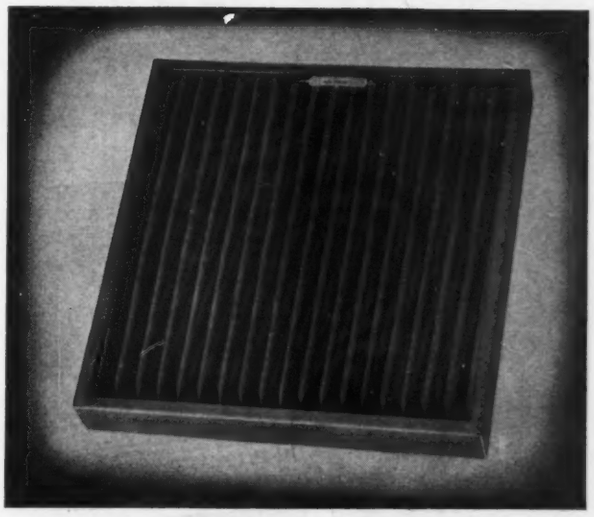
Light, sturdy and inexpensive is Torrington's new patented AIROTOR Blower Wheel. End rings are punched and formed in single pieces which are flanged to carry blades. Blades are punched and formed in a single strip. Hubs are rigidly mounted by peening which eliminates heavy flanges and rivets. *No rivets are used in the AIROTOR Blower Wheel.* Simple construction and sound engineering design insure a wheel producing maximum air delivery with a minimum of noise. Steel with aluminum lacquer finish is standard. Sizes 12" x 12" and 16" x 16". (20" x 20" under construction). Similar wheels will soon be available in a complete range of sizes from 3" to 20" in both single and double widths.

Bulletin includes performance ratings and housing scroll designs. Write for information on the complete Torrington line of Blower Wheels and Fan Blades.

Write for new bulletin

The Torrington Mfg. Co.
Torrington - Conn. U.S.A.

HERE'S THE SOLUTION
The Air Filter
that needs no replacement!



AIR-MAZE
Keenflo
AIR FILTER PANELS
For Air Conditioning and Ventilating Systems

Costly replacements are unnecessary with Air-Maze Keenflo air filter panels. They last as long as the air conditioning system in which they are installed and continue to give efficient, *trouble-free service year after year.* Occasional cleaning and charging after long intervals is all that is required to keep them at top-notch efficiency. After each simple servicing—*costing only a few cents*—they again have *the performance and characteristics of new filters.* Yet their initial cost is only a little more than conventional throwaway filters.

Of all-metal construction, Kleenflo panels are fire retardant, APPROVED BY THE UNDERWRITERS LABORATORIES. They are odorless, non-clogging, sturdy and dependable. They are easy to handle as they slip readily into standard size panel spaces. They represent the real solution to the air filter problem.

Write for Bulletin KCP-118.

AIR-MAZE CORPORATION
5130 HARVARD AVE., CLEVELAND, OHIO

AIR-MAZE

DEALERS MAKE MORE WHO
Sell all 4
GRAVITY. Round Oak builds a complete line of gravity furnaces for homes of any size.
SEMI-AUTOMATIC coal heating hits a new high in efficiency with dependable Round Oak stoker furnaces.
AUTOMATIC. For low cost automatic oil heat, the Round Oak X-series leads the parade.
CONVERSION. Contraflow Oil Burner practical for furnaces in homes of 4 to 15 rooms.

Never before have Round Oak dealers been able to extend their sales efforts over such broad furnace markets and reap such handsome profits. Today they are fully equipped to cover the entire warm air field. And they are really *selling all four* divisions of this field with the most complete line of guaranteed heating equipment in Round Oak history. Join them today. Take advantage of everything Round Oak has to offer. Cash in on all the *extra* sales and profits you've been missing. Write for liberal dealer terms.

ROUND OUT
WITH
ROUND OAK
of Dowagiac, Mich.
THE COMPLETE LINE OF
WARM AIR EQUIPMENT

With the Manufacturers . . .

Anthracite Stoker Schools

Anthracite Industries, Inc., 3207 Chrysler Building, New York City, held a series of special anthracite stoker schools at Merchandising School headquarters, Primos, Pa., recently. J. Morgan Kipe is director of Sales Training. A report revealed that 49 percent of the students registered at the five schools were engaged in sales, installation and service, with straight sales representatives accounting for the next highest group at 32 percent of the total, demonstrating the need for complete technical knowledge as a sales aid.

◆

Peninsular Holds Open House

Peninsular Stove Company, Detroit, distributors of repairs to fit all makes of stoves, furnaces and boilers, held open house at their showrooms—2699 Gratiot Avenue—on Friday, August 18. R. W. Taylor was host.

Fred Bishop of The Brundage Company, gave a very excellent talk on blowers as applied to the conversion job.

Bob Wettstein of American Artisan, and Ed. Carter of Snips talked on the advertising campaign in which Penninsular Stove is participating.

The attendance was large—among them D. C. Ellison of Northwestern Stove Repair Company, Chicago.

Refreshments were served, door prizes were given and the Peninsular Orchestra entertained.

◆

Ventilates Exhibitors Building

Twelve giant 48 in. ventilating fans with a capacity of 20,500 cfm., manufactured by the Schwitzer-Cummins Co., Indianapolis, are being installed in the Manufacturer's Building at the Indiana State Fair Grounds to remove smoke odors and uncomfortable heat of the mammoth building when crowded with fair visitors.

The twelve fans are being mounted in a row of windows at the top of the building to discharge the air through automatic outlet louvers. The fans are so connected that any or all of them may be used to suit the ventilating requirements of the season.

◆

National Advertising Campaign

Northwestern Stove Repair Co., 662 W. Roosevelt Road, Chicago; Capitol Furnace & Stove Repair Co., 523 E. Washington St., Indianapolis; Peninsular Stove Co., 2699 Gratiot Ave., Detroit; and Central Furnace & Stove Repair Co., 3937 Olive St., St. Louis, distributors of repair parts, are sponsoring a national advertising campaign—a campaign designed to stimulate the warm air heating business, both new installations and repair work.

The campaign began on September 4 and is to run for five weeks. Fifteen ads were scheduled in newspapers with a daily circulation of approximately 1,500,000—reminders that filters should be replaced, furnaces cleaned and repaired, controls checked and humidifiers added. Newspaper mats are available.

IRREGULAR SHAPES cut for 20% to 80% LESS COST

—with CAMPBELL NIBBLING MACHINES

—and cut better!

● Campbell Nibbling Machines cut irregular shapes in steel or other commercial materials up to one-half inch thick with greater economy than is possible by any other method. Savings often run as high as 80%. The machines frequently eliminate the cost of dies for short runs.

Campbell Nibbling Machines cut better—because they do not distort materials, set up internal strains or cause invisible fractures. Edges are left with no burrs—and require little or no finishing.

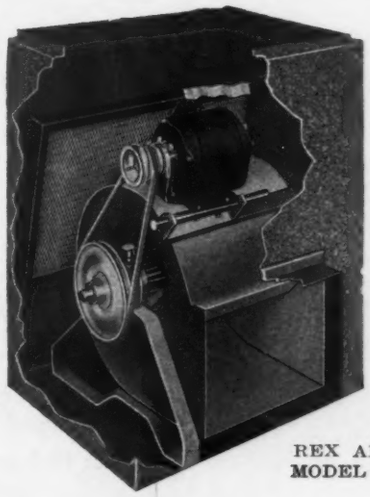
BUY ACCO QUALITY *in Campbell Cutting Machines, Wright Hoists, Page Welding Electrodes, American Chains, Tru-Lay Preformed Wire Rope and Reading-Pratt & Cady Valves.*

ANDREW C. CAMPBELL DIVISION
DESIGNERS AND BUILDERS OF SPECIAL MACHINERY
BRIDGEPORT, CONNECTICUT

Trade Mark

AMERICAN CHAIN & CABLE COMPANY, Inc.
In Business for Your Safety

7 profitable ways to increase your fall business!



REX AIR-PAK
MODEL JR 100.

1. Feature seasonable merchandise.
A ready-selling item for cooler weather is the REX AIR-PAK blower-filter unit.

2. Keep REX AIR-PAK on display.
Demonstrate to visitors how it provides winter air conditioning at low cost.

3. When you sell a gravity furnace—sell a REX AIR-PAK with it.
It will give the purchaser much greater satisfaction—and provide you with welcome extra profits.

4. Sell REX forced-air units to home-owners whose furnaces you are servicing.
Take advantage of your entry into their houses to talk "winter air conditioning."

5. Sell them to buyers of other products or services.
Show them that while they are making improvements they should also put their homes in the "air conditioned" class.

6. Promote REX AIR-PAK among all warm air users in your community.
There is a size and style to correctly take care of every furnace and house.

7. Always use REX A. C. BLOWERS—
for air conditioning jobs, conversion units you construct yourself, and ventilation. They are built to be widely adapted and to give excellent service.

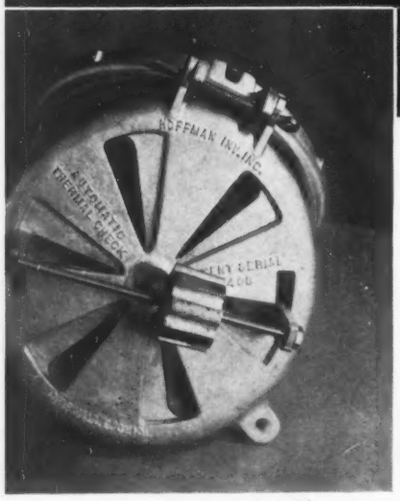
Before long, furnaces will again be lighted. So prepare for autumn sales now by writing for a copy of our latest sales manual: "How to Profit from Winter Air Conditioning." Your copy, together with prices and full details will be rushed promptly.

Air CONTROLS INC.
Div. of
The Cleveland Heater Co.
1933 W. 114th St. Cleveland, Ohio

EVERY FURNACE NEEDS

The New

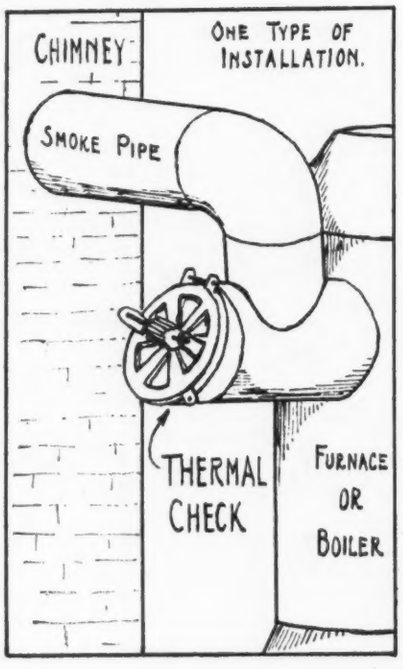
HOFFMAN AUTOMATIC THERMAL CHECK



Takes the guess work out of draft control

The Hoffman Automatic Thermal Check, easily and quickly installed in place of the ordinary "check" draft in the smokepipe, between chimney and furnace, contains a sensitive thermal coil that controls the automatic opening and closing of the draft in a manner that assures maximum furnace efficiency and ECONOMY.

Hundreds of delighted users have voluntarily endorsed its efficient and economical operation. The Hoffman Automatic Thermal Check sells readily and once one is installed in a locality many more sales are forthcoming. For the purchaser is always so pleased with its performance that he tells everyone he knows and does the selling for you. Yes, Mr. Dealer, here is a product that will make you many dollars of additional profits this year and also add many new and loyal customers to your list. Write today for full information . . . Do not wait . . . Mail the coupon AT ONCE.



MAIL THE COUPON

HOFFMAN THERMAL SALES CO.,
Box 28, Ann Arbor, Mich.
Please tell us more about the Hoffman Automatic Thermal Check; why it is a PROFITABLE heating control installation for us to Handle.

Firm .....
By .....
Address .....
City .....
State .....

HOFFMAN

THERMAL SALES CO.

Fritz Building

ANN ARBOR, MICHIGAN

With the Manufacturers . . .

Consumer Advertising Campaign

Owens-Corning Fiberglas Corporation, Toledo, Ohio, is launching an advertising campaign on Fiberglas Dust-Stop air filters, telling home owners the advantages of filtered warm-air heat, and the necessity for changing regularly.

The ads will appear every month this fall in American Home, Better Homes and Gardens, Saturday Evening Post and Life, with a total circulation of 8,750,000 copies. Jan S. Irvine, manager of filter sales, believes that the simple merchandising steps worked out will help every dealer sell more air filters, and at the same time open the way for other servicing jobs and furnace tune-ups.

The Dust-Stop advertising will tell the furnace owner why it is important to buy new filters for his furnace at least once a year from his warm-air heating contractor. The advertising stresses the economy, comfort and cleanliness of a forced warm-air furnace.

One of the ads is headed "Has Your Furnace a Stuffed-Up Nose?" Cartoon-type sequence pictures with text tell a clear, connected story.

Free postcards and free newspaper advertising mats will be supplied to warm air heating contractors during the campaign. The new booklet, "The Secret of a Comfortable Home," published by the National Warm-Air Heating and Air Conditioning Association, will be offered free.

Northwestern Dealer Party

The Northwestern Stove Company branch at 2323 Milwaukee Avenue, Chicago, held their annual fall dealer party on Friday evening, August 25, for the North and Northwest side dealers.

The regular bi-monthly meeting of the Furnace, Air Conditioning and Sheet Metal Institute, scheduled for August 24, was not held and instead the members attended the Northwestern dealer party.

Refreshments were served, and Northwestern introduced a new innovation in that they allowed no speakers.

Association Activities . .

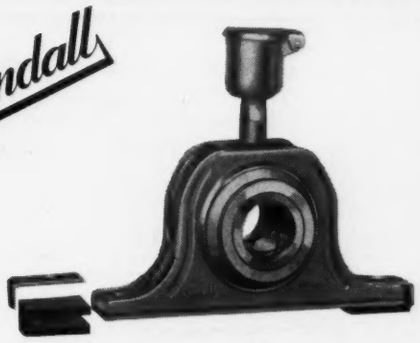
Chicago Golfers Hold Final Tournament

The Chicago Warm Air Golf Association played its final 1939 tournament at Oak Hills Golf Club, August 31, nine foursomes and three non-golfers, making a total attendance of thirty-nine. The large turn-out was a tribute to the efforts Paul Barth has made in his three years as secretary to make this a permanent group in the Chicago industry.

J. Harry Ebbert both ran and won the tournament, distinguishing himself by winning the championship cup with the low net score among members. D. C. Ellison made the presentation in fitting fashion. Jack Stowell of Aurora was the low net winner among guests. Low gross was won by C. E. Price and the high score prize went to J. Kurtz. J. J. Klapka had the fewest number of putts, Ed Nemec the greatest number. Paul Barth and A. A. Naussner had the greatest number of three's, Ralph King the greatest number of four's, F. De Pirro the most sixes and Wm. Gierman the most seven's. The highest score on any one hole was turned in by P. E. Monahan. E. N. Johnson had the longest drive off the first tee. Blind bogey winners were Ray Lorenz, Bill Kirby, Al Wilkins, Grant Wilson, Cliff Anderson and B. Bruggen. R. Payne Wettstein and Ed Carter won non-golfers' prizes and every one present was awarded a golf ball.

After distribution of the prizes, following dinner, Ed Nemec, retiring president, called for nominations for 1940 officers. Harry Ebbert, president; D. C. Ellison, vice-president; Ray Lorenz, secretary; and Grant Wilson, treasurer, were elected.

Randall



This efficient pillow block assures *quiet, trouble-free* blower operation

Users are enthusiastic over the new Randall one-piece steel housing pillow block. Low in cost for original installation and operation, and assuring freedom from metallic bearing noises, this pillow block is worth any manufacturer's attention.

For pillow block bearing applications where isolating rubber is desired, Randall has developed the new rubber grommet and steel washer shown above which can be furnished at slight extra cost. Write for full information.

●

Representatives carrying stocks

TEK BEARING CO.
177 Lafayette
New York City

AMERICAN STOCK GEAR CO.
100 St. Clair Ave., N. W.
Cleveland, Ohio

C. W. MARWEDEL
San Francisco
California

Randall GRAPHITE PRODUCTS CORP.
Dept. 911 609 W. Lake St., Chicago, Ill.

THE *Symbol* OF THE NEW AUTOMATIC HEATING

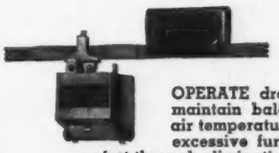
METAPHRAM REGULATORS

for DURABLE FURNACE CONTROL AT LOW COST

METAPHRAM combustion Regulators are self contained and the diaphragm units are the most powerful and durable of any metal diaphragms. Extremely accurate and sensitive, Metaphram Regulators represent the highest development in the regulation of fuel combustion to maintain steam pressures and water or air temperatures within close limits.

SECTIONAL DIAPHRAGM - - - EXCLUSIVE FEATURE

The unusual and exclusive design of the individual diaphragm, or Metaphram, which is made of the highest quality admiralty brass and which gives it its great power and resiliency is responsible for the power and durability of Metaphram Regulators. Sensitive elements in all Metaphram Regulators may be easily replaced in case of damage, eliminating the necessity of replacing entire regulators.



METAPHRAM WARM AIR FURNACE REGULATORS

OPERATE draft and check dampers so as to maintain balance between casing and return air temperatures. Provides safety by preventing excessive furnace temperatures, economy and comfort through elimination of overheating and underheating and labor saving by reducing number of firing periods.

METAPHRAM TANK HEATER REGULATORS

PROVIDE continuous, abundant supply of domestic hot water from coal fired tank heaters. Available in two types, immersion and surface. Mounted on vertical or horizontal pipe line, or on storage tank. Easily installed without draining water system. The lever arm of the surface type regulator is marked so that it may be adjusted for any desired water temperature.

Minneapolis-Honeywell Regulator Co., 2726 4th Ave. S., Minneapolis

MINNEAPOLIS HONEYWELL
Metaphram Regulators

Specify and Use On Every Job

DUX-SULATION

Genuine Asbestos Protected

THE "X" in Dux-Sulation's trade mark is the letter that identifies the one and only, the original and genuine Duct Insulating Material . . . It is the "X" that identifies the industry's Vote [X] of approval . . . It is the "X" that guarantees complete Duct Insulation Safety and naturally the "X" that is the answer to your Duct Insulating Problems [A+B=X] Beware of untried and unproven insulations . . . *In only* Dux-Sulation are you sure of getting the insulation that for years has been serving on thousands of jobs, both large and small, the country over.

●

Here are some of the features that make Dux-Sulation the ideal insulation for warm air, Air Conditioning, and Ventilation jobs.

Applies faster
Comes complete
Flexible in all directions
High insulating efficiency
High sound absorption
Low cost
No painting
Moisture proofed
Easy to handle
No waste
Light in weight
Asbestos protected
Fits rectangular or round ducts
Long life
New tape in STRIPS and SCORED to assure neatness and ease of handling
The most attractive finished job
Designed especially for heating and Air Conditioning jobs
Packed in heavy shipping cartons

Use Dux-Sulation on your next job... Look for the "X"...and in the meantime send to the office nearest you for full information.

●

GRANT WILSON, INC.
4101 West Taylor Street — CHICAGO

PLANT RUBBER & ASBESTOS WORKS
537 Brannan Street — SAN FRANCISCO

AIR CONDITIONING UTILITIES CO.
8 West 40th Street — NEW YORK

ATLAS ASBESTOS CO., LTD.
110 McGill St. — MONTREAL, CANADA

News Items . . . . . .

Distributor Leases Space

The Metal Goods Corporation has taken a ten year lease on a group of factory buildings at 3201-37 Brown Ave., St. Louis. These buildings contain a total of approximately 60,000 square feet of floor area, consisting of a three-story fireproof daylight structure 318x55 feet, and two one-story structures. They are served in rear by a private Terminal Railroad Association switch.

The Metal Goods Corporation distributes for several large aluminum, brass, copper and zinc concerns.

◆

Moore School Adds to Faculty

Appointment of a new member of the faculty of the metal shop of the Wm. R. Moore School of Technology, Memphis, Tennessee, has been authorized by the trustees, J. L. Skinner, director, announced in August. The instructor will probably be selected from Memphis men experienced in metal work and will take his position with the opening of the institute on September 1. The appointment is made necessary by the increasing enrollment in the metal shop courses. The increase in personnel will make it possible to offer special instruction in the welding of sheet metal in the night classes. The first regular session began January 2.

◆

Martin Sponsors Vocational Course

In co-operation with the Glenn L. Martin Company, Baltimore, school authorities have established a course to train high school graduates in the fundamentals of good industrial workmanship, use of hand tools in metal shops and, in particular, the making and assembly of aircraft parts.

On July 10 sixty young men, chosen by the Baltimore Public School Placement Bureau for the first course, began an intensive twelve-week training at Vocational High School, Baltimore, under the guidance of two instructors appointed by the school board and one from the Martin organization, and are now at work at the Martin plant. The successful outcome of the first experimental course determined the continuance of this type of training.

The classes maintain a strictly-business, 5-day, 8-hour schedule, with students punching a time-clock as in standard factory practice. Tools and materials for the course are loaned by the aircraft company, but no work produced at the school will be used in actual planes. Operating procedure for the course was formulated in a series of conferences between school executives and Martin factory officials which began in the early spring. At the completion of the course successful graduates are eligible for employment in the Martin assembly department.

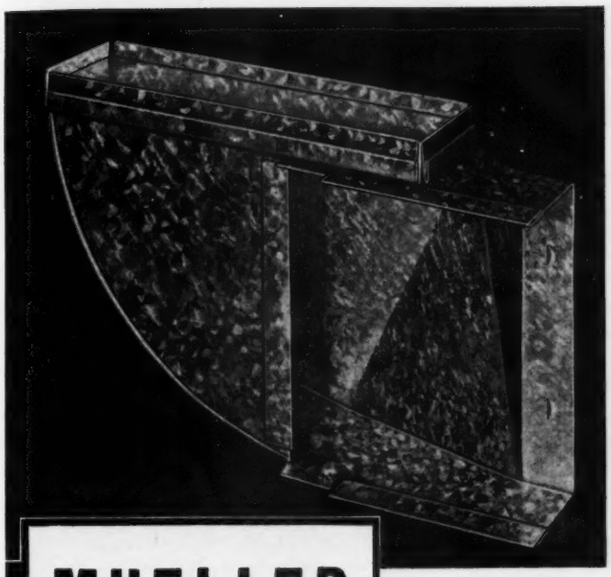
The new vocational course is the third educational project under Martin auspices.

The start of the Martin vocational training project, which has been in development for several months, very nearly coincided with publication of a report to President Roosevelt by an Interdepartmental Committee headed by Oswald Ryan of the Civil Aviation Authority. The report warned that 60,000 additional aircraft workers would be needed to execute current army and navy programs for expansion of aircraft strength and, among other recommendations, urged the establishment of vocational courses of this character.

◆

James W. Baker

Jas. W. Baker, Sr., 62, operator of a sheet metal shop at 763 Roanoke, Memphis, Tennessee, native of Dickson county, and who came to Memphis 40 years ago from Nashville, died August 5. He entered business for himself ten years ago, previously being with Patton-Tully Transportation Co. and West Kentucky Coal Co. His wife and three daughters survive.



MUELLER TAKEOFF FITTING

Ends Costly Trunk Reducers

Ingenious new Mueller Takeoff Fitting provides greatest open area for trunk line air. Expedites transition between branch area and trunk area. Easy to install. No screws required. All connection hooks furnished.

Mueller's exclusive new Takeoff Fitting (patent pending) is but one of the great time saving and money saving features of Mueller Pre-Fabricated Ducts and Fittings.

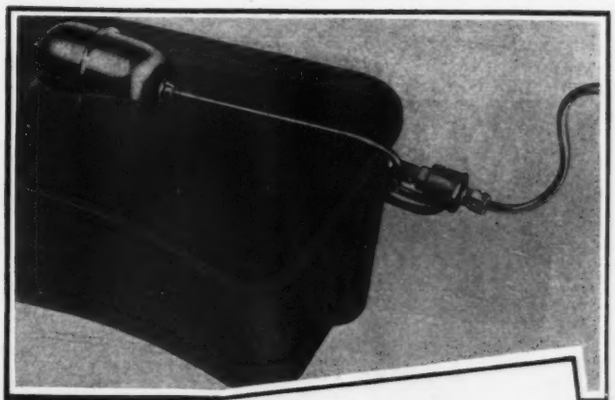
Read these other big advantages:

1. DEFINITE CAPACITY RATING—Mueller Catalog PF 38A gives useful and exclusive information on recommended capacities and equivalent lengths ratings.
2. LEAST "MAN-HOURS" INSTALLATION TIME—Mueller Pre-Fabricated fittings speed assembly. End lost time. Need for cutting sections is practically eliminated.
3. FEWEST NUMBER OF ITEMS—The Mueller System requires fewer trunk items than other systems. Needless items are eliminated.
4. FLEXIBILITY TO MEET BUILDING CONDITIONS—Mueller Ducts and Fittings fit standard joist and stud space and are adaptable to other peculiarities of building construction.
5. LOWEST INVESTMENT FOR COMPLETE STOCK—Fewer items in Mueller line mean a complete stock with small investment.
6. LOWEST OVER-ALL COST—Mueller ducts lower installation expense—cut material costs, reduce stocking and special fittings costs. You pocket the savings.

Increase your profit. Sell the complete matched Mueller System. Cut your cost of handling. Make more money on installation. Get in touch with your Mueller jobber today, or write us direct.

L. J. MUELLER FURNACE CO.
2010 W. Oklahoma Ave. Milwaukee, Wisconsin

MUELLER (m) MILWAUKEE
HEATING AND AIR CONDITIONING
COAL • OIL • GAS



M-VB ANNOUNCES New 3-Feature Humidifying Valve!

Manufacturers of warm air furnaces and air-conditioning equipment are welcoming this new M-VB Humidifying Valve — No. 300.

NO. 1. OUTSIDE MOUNTING
Mounting outside pan avoids intense heat, lessens corrosion and lime deposits on mechanism. Only the float operates in water.

NO. 2. EXTRA-LARGE PASSAGEWAYS
Prevent clogging due to pipe chips, etc.; also prevent leakage around plunger from back pressure.

NO. 3. NON-LEAKING
Plunger packing adequately guards against leakage. Long life built into every part in keeping with M-VB reputation for high quality.

SCOVILL *Masters of Metal*

Ask the wholesaler in your vicinity about No. 300 or communicate with Morency-Van Buren, Sturgis, Michigan.

M-VB
MORENCY-VAN BUREN DIVISION
SCOVILL MANUFACTURING CO.
Sturgis, Michigan

SCOVILL SAVES YOU TIME IN SELLING—TIME IN INSTALLING

Complete lines of water closet tank fittings and humidifier stocks also maintained at Waterville, Connecticut and San Francisco

EQUIVALENT OF
40 YEARS SERVICE
ON "SUICIDE" TEST BOARD
AND *still going strong!*

Again *new, improved*

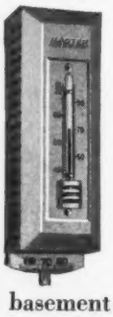
MASTER

HEAT REGULATOR

demonstrates its RUGGEDNESS!

From our laboratories comes dramatic proof of the ruggedness of the *new, improved* Master Heat Regulator! There, in a few grueling weeks, our engineers duplicated the strain and wear of 40 years of ordinary household service. The damper motor was carefully examined at the end of the test period. And there was scarcely a trace of wear!

Scientific proving methods are employed at every step in the manufacture of Master Heat Regulators. The result is a product that is *built to outlast any heating plant.* The consumer is the final proving ground for any product. Thousands of Master Heat Regulators are giving complete satisfaction in the United States and Canada.



No other regulator in its price class offers all these advantages: Snap-action thermostat insures positive contact and longer life. Quicker response to temperature changes. Transparent shield protects contacts from dust and lint. Maximum temperature differential only 1 degree. 4-pole electric motor of shaded induction type. Double contact circuit breakers. Self-aligning, self-lubricating bearings. 14-gauge steel housing encloses damper motor. Convenient basement switch. Manufactured by White Manufacturing Co., 2362 University Avenue, St. Paul, Minn., makers of scientific temperature controls for over 20 years.

BUILT TO OUTLAST ANY HEATING PLANT **MASTER** HEAT REGULATOR

MAIL COUPON AT ONCE!

WHITE MANUFACTURING CO. DEPT. (A.A.)
2362 UNIVERSITY AVENUE
ST. PAUL, MINNESOTA

PLEASE RUSH ME BULLETIN AND REMARKABLY LOW PRICE ON NEW IMPROVED MASTER HEAT REGULATOR.

NAME_____

ADDRESS_____

CITY_____ STATE_____

New Literature . . . .

For your convenience in obtaining copies of new Literature use the coupon on page 100.

203—Two-Speed Blowers and Motors

Leland Electric Company, 1501 Webster Street, Dayton, Ohio, is distributing a new folder entitled "New Standards of Home Comfort," illustrating and describing their two-speed blowers and blower motors.

◆

204—Blower Wheels

Janette Manufacturing Company, 556 West Monroe St., Chicago, is distributing a small folder entitled "Janette Blower Wheels." Blower wheels built in eight different diameters and nine widths are available, for coal stokers, oil burners, and air conditioners.

◆

205—Slip Roll Forming Machines

Niagara Machine & Tool Works, 637 Northland Avenue, Buffalo, has just released Bulletin 77-A, covering Niagara Slip Roll Forming Machines, hand and motor driven, up to and including 4-in. rolls. Attention is invited to the trigger release which permits easy removal of the finished cylinder.

◆

206—The Air-Vane Line of Registers

Rock Island Register Company, 2435 Fifth Avenue, Rock Island, Illinois, is distributing an 8-page folder covering the Air-Vane Line (800 Series) of air conditioning registers and intakes. Following illustrations and description, list prices of the various sizes are included.

◆

207—Enjoy Tropical Luxury

Pocahontas Fuel Company, Incorporated, Stoker Division, 1190 East 152nd Street, Cleveland, is distributing an 8-page catalog entitled "Enjoy Tropical Luxury with the O. P. Coal Burning Winter Air Conditioner." General specifications are included. Maximum rated output is 250,000 Btu per hour.

◆

208—General Data Book

Joseph T. Ryerson & Son, Inc., 16th & Rockwell Sts., Chicago, is distributing a general data book—a reference and data book containing metallurgical definitions, heat, hardness and numerical equivalent tables; weight, dimension, and specific gravity tables; carbon steel, drill rod, non-ferrous, tubing, sheet, and manufacturing tolerances. Also standard specifications for reinforcing bars, boiler tubes, plates, bridges, building; safe load tables, etc.—a 144-page book (size 4½ by 8½ in.) with a 3-page index.

◆

209—Painting and Finishing Equipment

Spray Engineering Company, 114 Central Street, Somerville, Mass., is distributing a catalog entitled "Spraco Painting and Industrial Finishing Equipment." The catalog covers the various models of spray guns, needles, nozzles, pressure and gravity feed containers, ventilated metal spray booths, exhausting equipment and other spray painting equipment, with tables for nozzle combinations recommended for the guns, and a price bulletin on guns and attachments.

◆

210—It's June in January

York Ice Machinery Corporation, York, Pa., is distributing a 4-page folder entitled, "It's June in January and Every Month with Yorkaire Heat," covering their oil-fired air conditioner.

"Warmth Without Work or Waste," a 4-page folder, covers the Yorkaire Heat gas-fired air conditioning furnace.

"Enjoy June Comfort All Winter" (4 pages) illustrates and describes the Yorkaire Heat split-system air conditioner.

"In the Good Cool Summertime" (4 pages) describes and illustrates the Yorkaire residential summer conditioner.

All four folders have space for imprinting the distributor's name and address.

ECONOMY *Air Conditioning* UNIT

ECONOMY *Square Cased* AIR CONDITIONER

COMFORT . .
CLEANLINESS . .
HEALTHFUL HUMIDITY . .
ATTRACTIVE APPEARANCE . .
CLIMATE CONTROL

Ten Year Maintenance Agreement

All International Furnaces can be covered by our Ten Year Maintenance Agreement which operates like an insurance policy and takes care of replacement labor and materials—including even grate bars—over a period of ten years. It is the only maintenance agreement that fully protects jobber, heating contractor, and owner alike. It is the most powerful selling help ever offered the heating trade, and home owners are demanding International products covered by this protection. It will pay you to investigate. Send for complete information to Dept. A-5—today.

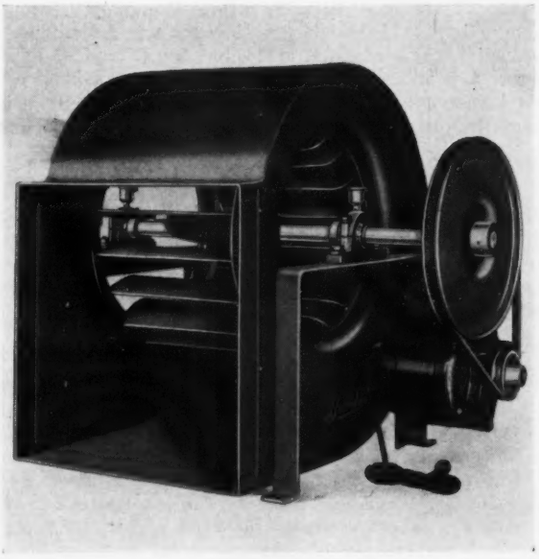
INTERNATIONAL HEATER COMPANY

UTICA, N.Y., U.S.A.

Western Office and Warehouse, 1933 Wentworth Avenue, Chicago, Ill. • New England Office and Warehouse, 110 Chestnut St., Nashua, N.H.

Stocks carried in Principal Cities throughout the U. S.

Here's the Forced Circulating Unit Your Customers Want



The motor is securely rubber-mounted to provide vibration-free operation. The fan is a multi-blade type specially designed to deliver a large volume of air against the back pressure encountered in the usual forced air system.

Unusually quiet in operation, it will give your customers many years of satisfactory service. What better way is there to build your own reputation for good work well done?

Write for Bulletin 3044.

BUFFALO FORGE COMPANY
497 Broadway Buffalo, N. Y.
Branch Engineering Offices in Principal Cities
Canadian Blower & Forge Co., Ltd., Kitchener, Ontario

"Buffalo" "HVA" FANS

LAU
400 SERIES
BLO-ETTE
Package Unit Furnace Blower
Brings You

New Profits in Winter
AIR CONDITIONING

This 1000 CFM Lau Package Unit Furnace Blower . . . now only $42.50 (other sizes available at correspondingly low prices.)

Live wire dealers are finding that BLO-ETTE opens up a new field of blower sales in thousands of homes where unsatisfactory gravity furnaces are now in operation. BLO-ETTE, a centrifugal type blower, increases heating plant efficiency up to 25%. Gently forced air eliminates drafty corners, cold floors, comfortably warms hard-to-heat rooms. Specially treated filters remove over 90% of dust, soot, lint, dirt from air . . . a fine selling point in that this protects home owner's nose and throat, also furniture, draperies, blankets, etc. Shipped assembled, low in cost, ready to install.

Features of 401 BLO-ETTE

- Shipped assembled—goes through any door.
- Large access door.
- Circulates filtered air from basement for summer cooling.
- Automatic cut-out on motor.
- Two 16"x25" filters.
- Leak proof filter frames.
- Quiet operating.
- Self-aligning—self-lubricating bearings.
- Top motor mounting.
- 1/6 HP Long Hour Motor.
- Also sold less casing, filters, and motor.

OTHER LAU PRODUCTS
Pillow Blocks
Blower Assemblies
Pulley Wheels
Blower Housings
Blower Wheels
Niteair Attic Fans

MAIL COUPON TODAY!

The Lau Blower Company, 934 E. Monument Ave., Dayton, Ohio
Gentlemen: Please send us FREE descriptive literature, data, and prices on 400 Series Lau BLO-ETTE.

Name .....Street .....
City..... State.....
Other products which interest us.....
.....

New Literature . . . .

For your convenience in obtaining copies of new Literature use the coupon on page 100.

211—Prefabricated Ducts and Fittings

The Williamson Heater Company, Cincinnati, Ohio, is distributing their "1200 Series Simplified System of Prefabricated Ducts and Fittings" for forced air heating and air conditioning installations—24 pages.

◆

212—Recoy Coils and Coolers

Refrigeration Economics Company Incorporated, 1232 Second Street, N. E., Canton, Ohio, is distributing Bulletin F listing types and sizes of coil for commercial refrigeration or air conditioning, unit coolers and heating coils.

◆

213—Furnace Refractories

McLeod & Henry Co., Inc., Troy, N. Y., is distributing a 12-page catalog entitled "Furnace Refractories." Improved refractory designs for domestic automatic furnaces are described. Stoker baffles and domestic oil burner chambers are illustrated and described.

◆

214—Defeat Summer Heat

The Emerson Electric Manufacturing Company, 1824 Washington Ave., St. Louis, offers folder X3526 entitled "Defeat Summer Heat with an Emerson-Electric Home Cooler Fan," for dealer distribution. Specifications cover 36, 42 and 48 in. fans with and without accessories.

◆

215—The Story of a Popular Cellar

Century Engineering Corporation of Cedar Rapids, Iowa, is distributing "The Story of a Popular Cellar" which answers questions about automatic heat and air conditioning. There are suggestions on how to modernize basements. Subject matter covers financing, costs, types of heating systems and related ideas. Copies are available.

◆

216—Attic Design Fan Blades

The Torrington Manufacturing Company, Torrington, Conn., has published a new bulletin on Airistocrat quiet propeller fan blades—attic design, 36, 42 and 48-in. diameters, 2, 3 and 4-blade models. Steel blades, steel spiders, steel hubs; finished plain, aluminum lacquered blades—black lacquered spider and hub, or all one-color lacquer.

◆

217—G-E Capacitator-Motors

General Electric Company, 1 River Road, Schenectady, N. Y., is distributing publication GEA-2420—Capacitator-Motors for domestic water pumps, shallow-well and deep-well, vacuum heating pumps, refrigerant pumps, water circulators, irrigation pumps, dairy pumps, sump pumps and oil pumps.

◆

218—Catalog No. 49

Northwestern Stove Repair Co., 662 West Roosevelt Road, Chicago, is distributing Catalog No. 49, dated August 1—a confidential trade price list on furnace repair parts to fit practically all makes of furnaces.

The company also handles a line of furnaces, blowers, pipe, fittings, registers, controls, tinner's snips, tinner's red and gray, asbestos paper, furnace cement, paint and all supplies necessary to the furnace sheet metal contractor.

◆

219—All Steel Shear Catalog

The Cincinnati Shaper Company, Cincinnati, Ohio, is distributing a 28-page catalog of the Cincinnati All Steel Shear.

This 8½x11 in. catalog illustrates and describes the complete line of Cincinnati Shears and gives the details of the ball bearing micrometer back gauge, hydraulic holddowns, safety drive and other features. It also covers a wide variety of optional equipment such as power back gauge, power front gauge, electric clutch control and others.

Save Time on Forced Air Jobs With the Aid of This Practical Designing Manual

SECOND EDITION

FORCED AIR HEATING

215 Pages—6"x9"—clothbound—
Illustrated—$1.00

109 Illustrations
15 Charts
23 Formulas
19 Tables

Into this enlarged second edition has been put, in simple, readily understandable form, ALL the information the contractor needs to enable him to design any forced air heating system correctly and efficiently. It embodies all of the really worthwhile data on forced air heating that has been made available during the past several years, and shows by clear examples how to apply this knowledge properly in actual design work.

In designing a complete winter air conditioning system for a typical residence step by step, this practical manual outlines a model procedure of design, based on wide experience, which the contractor may follow with confidence on any of his own jobs. It also gives him a new data sheet, the use of which makes it impossible to overlook any factor in figuring the heat load, and shows in complete detail how to fill it in.

Every thought and device to make the new FORCED AIR HEATING a practical, everyday guide to correct procedure in forced air design work has been included in it.

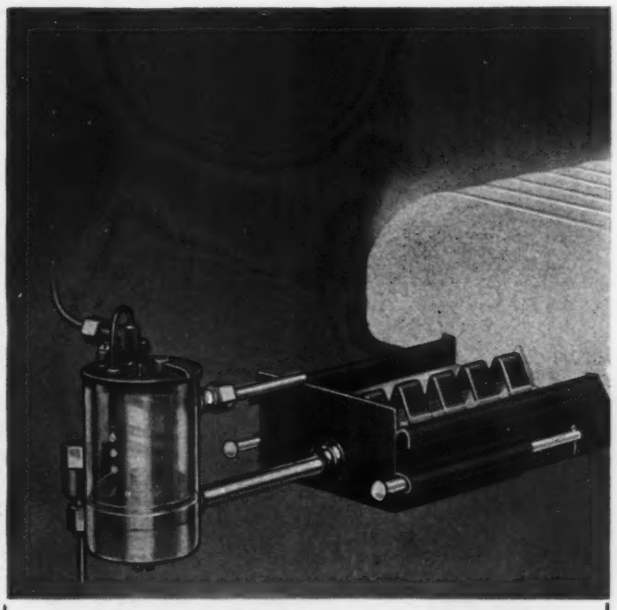
Every contractor who is anxious to avoid mistakes and wasted time in forced air work should own a copy of this book. Send $1.00 today to the address below for your copy. You may order with the privilege of returning the book within ten days for a refund, if for any reason it should prove unsatisfactory.

CHAPTER HEADINGS

A Suggested Data Sheet, Procedure of Design, Sizing the Apparatus, Infiltration, Registers and Returns, Multiple Registers, Return Air Systems, Selecting Register Temperatures, Temperature Drop in Ducts, Mechanical Code for Forced Air Heating, Sizing Ducts by Friction Chart Method, Sizing Extra Long Runs, Pressure Losses, Velocities, Proportioning Losses in Heating Systems, Branch Take Offs, Volume Dampers, Bonnets and Plenums, Casing Baffling, Chimneys and Drafts, Air Conditioning Radiator Heated Houses, Automatic Control, Contract and Specifications, The Index.

KEENEY PUBLISHING COMPANY

6 North Michigan Ave., Chicago, Illinois



FLOAT-CONTROL BECOMES SCIENTIFIC WITH MONMOUTH

FLOTROL

(1) *What is the Flotrol?*
It is the successor to ordinary float controls.

(2) *In what ways is it superior to ordinary float controls?*
It is much more compact, has a visible feed, and visible water level, and cannot corrode or lime up, etc.

(3) *Why won't it corrode?*
Because the transparent polystyrene cup and chrome-nickel alloy interior mechanism are corrosion proof.

(4) *Why won't it lime up?*
Because the mechanism is hermetically sealed against evaporation; the air inside is sealed in, and the water flow to the pan cannot reverse.

(5) *Does it automatically give correct humidity for all weather conditions?*
Yes, except in the more severe weather when the manual control lever at the top is used to prevent excessive humidity.

The foregoing advantages—plus a very remarkable price—explain why many leading furnace manufacturers and dealers have adopted the Flotrol Humidifier. Complete information will be sent upon request.

MONMOUTH PRODUCTS, INC.

1933 East 61st Cleveland, Ohio

AUTOMATIC JUNE
GRADUATED HUMIDITY CONTROL

MONCRIEF FURNACES

MONEY MAKERS in Any Community

SERIES "C" CAST

You find profit and genuine satisfaction in Moncrief Furnaces because they are styled for easy selling and substantially built to give the home owner long hard service. They include every element that contributes to economy and high efficiency.

MONCRIEF Winter Air Conditioners

In specialized types for coal, gas or oil. Modern design pleases the eye; scientific construction produces the utmost in efficient automatic operation. The complete Moncrief line gives you every opportunity to compete to advantage for the winter air conditioning business of your community.

DON'T FORGET: Moncrief Engineering Service is at your command at all times.

Write for catalogs.

THE HENRY FURNACE & FOUNDRY CO.
3473 E. 49th St., Cleveland, Ohio

We supply everything used on a warm air heating and winter air conditioning job

New Literature . . . .

For your convenience in obtaining copies of new Literature use the coupon on page 100.

220—Catalog No. 50

Capitol Furnace and Stove Repair Co., 523 E. Washington St., Indianapolis, Indiana, is distributing catalog No. 50, dated August 1—a confidential trade price list on furnace repair parts to fit practically all makes of furnaces.

◆

221—Tharco

The Armstrong Company, 241 Post Street, Detroit, is distributing an envelope stuffer covering Tharco asbestos furnace cement, containing an asbestos fibre. Tharco is prepared in plastic form.

◆

222—Gravity Fittings Manual

L. J. Mueller Furnace Co., 2005 West Oklahoma Avenue, Milwaukee, is now publishing a "Gravity Fittings Manual," which offers a simplified manner of estimating a typical gravity job. Also the ordering of material.

◆

223—Lower Shop Costs—Bigger Profits

The Lockformer Co., 4630 West Flournoy Street, Chicago, is distributing a 4-page folder entitled, "The Lockformer Way to Lower Shop Costs and Bigger Profits." Comments of dealers and contractors are included.

◆

224—Thermal Check

Hoffman Thermal Sales Co., 103 E. Liberty St., Ann Arbor, Michigan, is distributing a small folder entitled "Save 20 to 30% with Hoffman Thermal Check."—a device which causes the combustible gases in the coal to be mostly consumed as heat.

◆

225—Controlled Arc Welding Equipment

General Electric Company, 1 River Road, Schenectady, N. Y., is distributing Bulletin GEA-3042-A "Faster and More Uniform Welding," with new Thyratron-controlled G-E automatic arc-welding equipment, for use with bare or lightly coated electrodes.

◆

226—ABC of Gas Heating

The Bryant Heater Co., 17825 St. Clair Avenue, Cleveland, is distributing the second edition of "ABC of Gas Heating," in four sections—The Fuel Gas, Gas Heating Equipment, Questions and Answers, and Saving Heating $'s.

◆

227—Gravity Furnace Code Requirements

The National Warm Air Heating and Air Conditioning Association, 5 East Long Street, Columbus, Ohio, has approved and issued a revised form of the "Standard Code Requirements for Gravity Furnace Installations." Pages 2 and 3 cover the type of construction, with explanatory notes, while page 4 gives the heat loss factors, computed from the 1939 ASH&VE Guide, for exposed walls.

◆

228—Guidebook for American Businessmen

Secretary of Commerce Harry L. Hopkins announces a new guidebook for American businessmen, the "Industrial Market Data Handbook," containing information for establishing new sales territories, production quotas and marketing campaigns. The handbook contains complete figures on industrial production, employment, value of products, cost of material, fuel and power, and output per wage earner for each of the 3,070 counties in the United States, and similar data for every city of more than 10,000 population. Figures pertain to 1935.

The handbook was prepared as a cooperative study by the Bureau of Foreign and Domestic Commerce, the Census Bureau, and the Bureau of Mines. Copies may be obtained from the Superintendent of Documents, Washington, D. C. The price is $2.50. The publication may be further identified as Domestic Commerce Series No. 107.

How to do 5 JOBS WITH ONE MACHINE

Why buy 5 machines when this one No. 164 Niagara Universal Machine does 5 jobs! Burring, Turning, Wiring, Crimping and Beading is made easy by quickly interchangeable rolls.

Clamps to bench, takes little space, gears completely enclosed, rigid cast housing maintains alignment and easy operation.

Remember,—your profits are made IN YOUR SHOP . . . good up-to-date machines and tools are a good, worthwhile investment.

This No. 164 Universal Machine is just one of the Niagara complete line of money making machines for Sheet Metal Shops,—write for Catalog No. 94.

NIAGARA MACHINE & TOOL WORKS
637-97 Northland Ave. Buffalo, N. Y.
Branches: Cleveland Detroit New York

NIAGARA

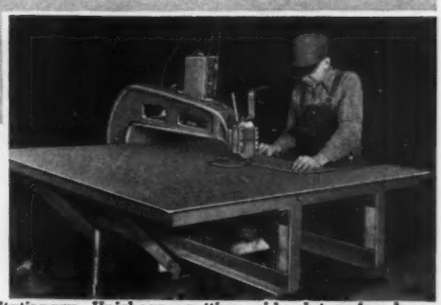
CUT COSTS WITH STANLEY UNISHEARS!

CUT SHEET MATERIALS ANY PATTERN

No. 144A Unishear trimming large stamping for cab top. Cuts up to 12-gauge hot rolled steel.

At 2500 shear cuts per minute, Stanley Unishears slice cleanly through sheet materials . . . reduce time and labor, and cut waste to a minimum. Even short-radius curves are *easy* to follow.

Ask your Stanley Distributor to demonstrate Unishears on your own work. Or write for literature. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.



Stationary Unishear, cutting side-plates for large street-sweepers.. Substituted for rotary power shear, Unishear cut time from 32 hours per hundred pieces to just 13 hours!

The "Mighty Midget" has a capacity of 18 gauge hot rolled steel.

STANLEY UNISHEARS
THE ELECTRICALLY DRIVEN HAND SHEARS

New Literature . . . .

For your convenience in obtaining copies of new literature, use the coupon on this page.

229—Catalog No. 39

Peninsular Stove Co., 2699 Gratiot Ave., Detroit, is distributing Catalog No. 39, dated August 1—a confidential trade price list on furnace repair parts.

◆

230—Secret of a Comfortable Home

National Warm Air Heating and Air Conditioning Association, 11 West 42nd Street, New York City, is selling to dealers and installers for distribution by them a consumer booklet, the purpose of which is to give the members of the association a piece of sales literature that will enable them to tie up their own products with the co-operative thoroughly acquainted with the visual presentation, and

The booklet is addressed to the householder in non-technical terms, and fits in a No. 10 envelope. It describes in simple language the advantages of the warm air system in providing for year-'round comfort and explains how complete air conditioning can be installed in connection with the warm air furnace through forced circulation, humidity regulation, filtration and refrigeration.

◆

231—The Survey Selling Plan

James C. Parks, 1243 Rockwell Avenue, Cleveland Heights, Ohio, has published "The Survey Selling Plan," for old house winter air conditioning, which provides two tools to work with.

First—a visual presentation of winter air conditioning that is simple, non-technical and complete in that it contains all that will be necessary to explain to a prospect **what** it is, **what** it does, and **how** it does it, and convince of its value. It definitely explains **heat**—what it is and where it comes from; **air**—its functions and uses; the necessity of automatic control; the distribution of heat; humidification and its benefits; air cleaning; summer cooling by re-circulation.

Second—a survey sheet that can be filled in by anyone thoroughly acquainted with the visual presentation, and which discloses to the estimator the building, its size, shape, construction, building materials, exposure, the number and age of occupants, characteristics and heat requirements. If completely filled in, the survey sheet enables the estimator to select the size and locate the units, design a distributing system and specify and price a complete job.

The author and seller of the plan has used it personally in selling and claims the following advantages:

Attracts high-grade salesmen
Discourages price cutting
Co-ordinates salesman-dealer-manufacturer
Provides a dealer selling-plan
Assures successful installations
Educates the public
Assures profitable jobs.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

157	158	159	160	161	162	163
164	165	166	167	168	169	170
171	172	173	174	175	176	177
178						
203	204	205	206	207	208	209
210	211	212	213	214	215	216
217	218	219	220	221	222	223
224	225	226	227	228	229	230
231						

Name ..... Title.....

Company .....

Address .....

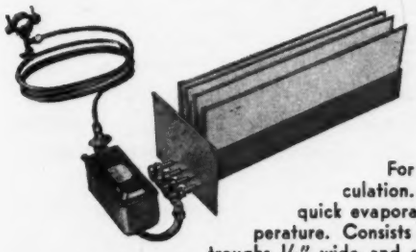
Are you Manufacturer———Jobber———Dealer———

HERE IT IS
THE Leader FOR 1940
PACIFIC offers superior construction features, trouble-proof operation, longer life, utmost customer satisfaction. Keep posted on all Pacific products and prices. A correct size for every heating and air conditioning problem. Mail Coupon now!
Salues TOMORROW'S AIR-CONDITIONING NEEDS Today!
Pin to your letterhead . . Mail today.
Pacific Gas Radiator Co. Dept. AA-9)
Huntington Park, Calif.
Send complete literature and prices on—
Name
Address
26 SUCCESSFUL YEARS
AND STILL GROWING
Pacific

Make *Extra Profits* on *EVERY* Warm Air Job

The advanced Maid-O'-Mist line includes a *more complete* selection of warm air humidifiers. Also included are humidifiers for hot water and steam heating systems, as well as automatic water feeders for furnace humidifier pans.

Send Today for Catalog A-9

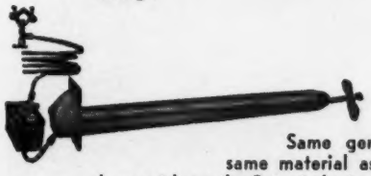


The "Convector" Humidifier

For forced or gravity circulation. Offers continuous quick evaporating even at low temperature. Consists of two or four copper troughs 1/4" wide and spaced 1" apart. Patented, metal-edged, replaceable evaporators six inches high are of special absorbent material and corrugated. Troughs are mounted securely on a flat hood plate 5" wide x 8" high which fastens on the plenum chamber wall with metal screws. Rear end of humidifier is supported by a truss brace which extends to the top of the front plate. Water Feeder is of brass, copper and Monel metal, with all parts, including copper float, nickel plated. Convector Humidifier is available in eight sizes. The smallest size has evaporating capacity of 25 lbs. of water per day at 130°, and up to 77 lbs. per day at 230° on gravity circulation.

No. 9 ZEPHYR Automatic Humidifier

For all types of furnaces. Pan, 4" x 36", stamped from genuine sheet bronze (nine times as efficient as cast or sheet iron in heat transmission). Heating area exceeds 350 sq. in. Patented air deflectors. Patented adjustable overflow plate prevents over-saturation. Adjustable hood fits slope of furnace bonnet. Water supplied by new type Water Boy Safety-feeder, with water line adjustment and located away from heat to avoid corrosion. Equipment includes saddle valve, copper tubing, complete fittings.



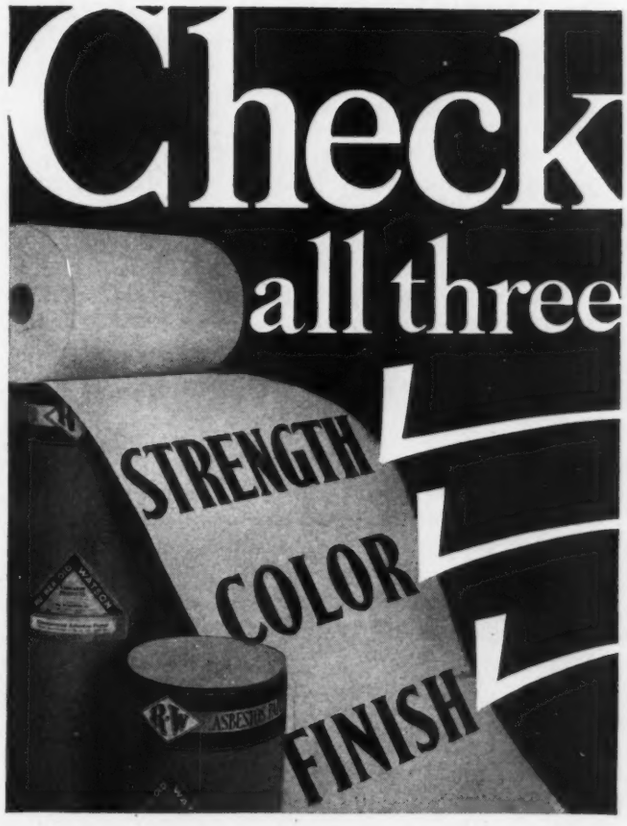
No. 58-H Maid-O'-Mist Humidifier

Same general design and made of same material as the No. 9 except that it does not have the Patented wing deflectors. It is 36" x 3⅝" in size. Water supplied by No. 59 Water Feeder located away from heat of the furnace. Reservoir and cover are of Nickel Plated finish. Water line easily adjusted. Humidifier comes complete with all fittings, hood and Patented adjustable overflow plate.

No. 20-H Drip Humidifier

Same pan as the No. 9. It does not have the Patented wing deflectors or overflow plate. Pan is 36" x 3⅝" in size, and has an evaporating area of 126 sq. in. Supplied with water by Hand Controlled Drip Water Feeder with sight feed. Equipment includes saddle valve, 6 ft. 1/4" O.D. Copper tubing, and overflow pipe.

MAID-O'-MIST, Inc.
180 N. Wacker Drive. Chicago. Ill.



You can be sure of all three features—strength, color and finish—when you use RU-BER-OID—Watson No. 43-A Asbestos Paper.

You have flexible paper of accurate caliper, made from 95% pure asbestos. You have unusual wet strength, so essential when paste is applied. You have extra strength, obtained by a special processing, not by adulterants of inflammable character.

You have the much-desired color of blue-white. You have a finish that is smooth and water-repellent on one side—rough-textured for adhesion on the other side.

These advantages make No. 43-A the ideal asbestos paper for protecting air conditioning ducts, wood partitions, wrapping furnace pipes, lining stoves, ovens and gas ranges.

Mail the coupon for a free 5-foot test sample. Compare strength, color and finish. You, too, will say No. 43-A has everything.

RU-BER-OID R·W WATSON
ASBESTOS PAPERS

The RUBEROID Co., *Insulation Department* AA-9-39
500 Fifth Avenue, New York City

Send us your free 5-foot test sample of No. 43-A Asbestos Paper. We understand this places us under no obligation.

Name.....

Address.....

City..... *State*.....

Since Ruberoid sells through wholesale trade only, please give jobber's name.

.....

FREE THIS CANISTER CONTAINING *5 foot Sample*

Welding the Copper Alloys

(*Continued from page 74*)

used to weld the low zinc brasses, exceptional care is necessary in order to avoid such delays.

It is safe to say, therefore, that the straight copper-zinc alloys will not be found commercially practicable where gas-tight resistance welded seams are desired. Where a connection of reasonable strength with an occasional imperfection in the weld is satisfactory, brass can be and is commercially weldable by resistance methods.

Silicon

Silicon has been used as a deoxidizer of copper alloys since about 1895. It was not, however, until after the late Mr. Chas. B. Jacobs, in 1925, patented the copper-silicon-manganese alloy, known as "Everdur," that such material became available in sheets of any desired size and thickness. The silicon and manganese in Everdur "A" make with the 96% copper, a high strength, corrosion-resisting, ductile alloy which is readily hot forgeable over a wide range of temperatures and equally readily weldable by almost any method.

The silicon depresses the electrical and thermal conductivities to such an extent that resistance welding of Everdur is readily accomplished by the usual 100 kva. transformer. Copper alloyed with silicon alone forms, under fusion welding heats, a harsh, refractory scale. Modified with manganese and to a lesser extent with zinc, the scale formed at welding heats is in the nature of a thin, transparent, fusible glass. If allowed to harden, it becomes an excellent dielectric which interferes greatly with resistance welding operations. It is important, therefore, that the surfaces of silicon alloys be scrupulously clean before welding is attempted.

Nickel

Next to silicon, nickel is the alloying element in copper contributing most to resistance weldability. Roughly, silicon is about six times as effective as nickel and ten times as effective as zinc in improving the copper alloy for resistance welding.

As is well known, nickel is soluble in copper in all proportions. Unlike manganese, it has a profound effect on the strength of the resulting alloy. It is not a deoxidizer but requires manganese, zinc, silicon or some other element to free it of oxygen and sulphur. Nickel depresses the electrical conductivity rapidly. Thus with 10% nickel and 90% copper, the conductivity is only 12% of that of pure copper, while with the 70:30 cupro-nickel it is less than 5%. This explains in a large measure the excellent rating given the nickel-bearing copper alloys.

One might think that, since both silicon and nickel are beneficial in producing with copper good resistance weldability, an alloy carrying copper,

Sell Fresh Air
• With the public becoming more and more air conditioning minded, by recognizing the importance of having clean humidified air in the home during the long heating season, we know that furnace dealers throughout the country can profit by this knowledge in letting Skuttle help them "Sell More Fresh Air" with the famous Skuttle automatic humidifiers.
Why not let Skuttle help you too, in building up your sales and profits during the coming heating season. Full particulars will be sent upon request.
WRITE TODAY FOR Skuttle INFORMATION
J. L. SKUTTLE COMPANY
AUTOMATIC HUMIDIFIERS
999 FRANKLIN ST., DETROIT, MICH.

TO THE

Furnace Dealers of America:

Here's a brand new idea in the merchandising of furnaces . . . an idea that will mean increased sales and larger profits for you. Yes, this deal will allow you to present *Marion* Furnaces and Air Conditioning Units to your customers at a price so low that it will meet any competition. The *Marion* is a line of quality furnaces, made and guaranteed by our organization which has many years of successful operation behind it . . . an organization that has been aggressive and is, at this stage of the game, setting the pace in the warm air heating field with this new merchandising plan. So we suggest that you write us immediately and get the complete information on this plan that is designed to secure business that you are now losing. Act now . . . write Dept. A for explanatory literature.

Very truly yours,

MARION FURNACE CO.

2970 W. Grand Blvd. Detroit, Mich.

ARMSTRONG'S for PROTECTION

Manufactured by

The Armstrong Company

Tharco is but one of the many successful products that has won for Armstrong an outstanding position in the field of furnace cements, putties, caulking and glazing compounds. One of the oldest furnace cements on the market, it has been developed with a practical understanding of the needs of the furnace installer, manufacturer and repair man. Consistently good performance has been responsible for the feeling throughout the heating industry that Tharco is America's best furnace cement.

MANUFACTURED ONLY BY

THE ARMSTRONG COMPANY

DETROIT DALLAS CHICAGO

An outstanding product for more than 25 years.

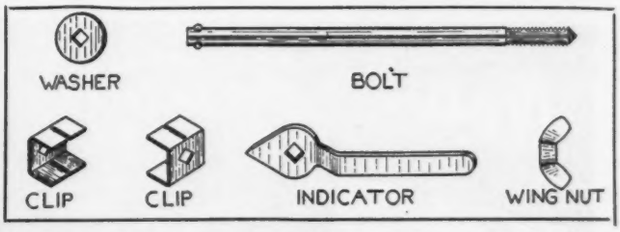
"BB"

The mark of quality on sheet metal and roofers' supplies

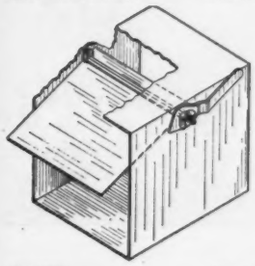
BERGER BROTHERS CO.

229-237 ARCH STREET, PHILADELPHIA, PA.

EAVES TROUGH
GUTTER HANGERS
CONDUCTOR PIPE
CONDUCTOR FASTENERS
MITRES
END PIECES AND CAPS
CONDUCTOR HEADS
ORNAMENTAL STRAPS
VENTILATORS, ETC.



SILENT! AIR-TIGHT! RIGID!



Here's the "last word" in efficient damper control combined with speedier installation! The new patented MINUTE Damper Regulator has exclusive features of design that assure rigidity without sag or buckling. Absolutely chatter-proof and air-tight. No rivets, tiny nuts, bolts or sheet metal screws. Can be installed in one minute's time on most jobs. New dependability for wide range of damper sizes and shapes. Distributors: Write for profit-proposition.

MINUTE DAMPER CONTROL

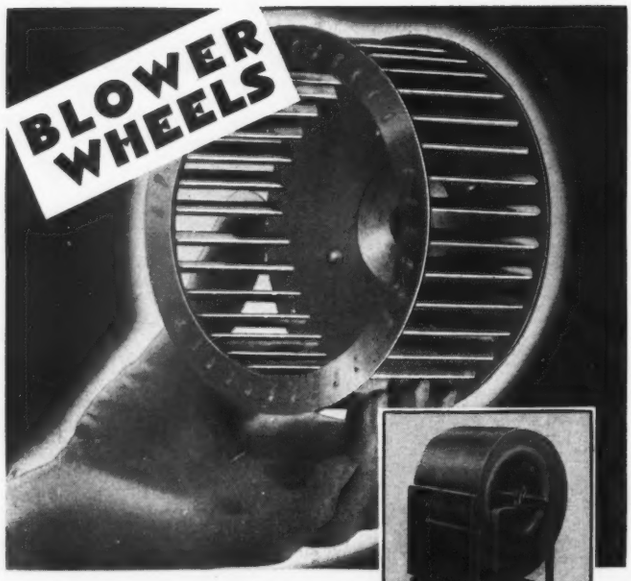
Works better!
Saves TIME!

FREE TRIAL

JOAL MANUFACTURING CORPORATION
2058 Canton St., Toledo, Ohio

Please send us a FREE SAMPLE of the Minute Damper Regulator and price list.

Name .....
Address .....
City .....State.....
Distributor's Name .....
Address .....



"HAVE CLARAGE MAKE THEM"

Every year we ship to furnace manufacturers and to builders of unit air conditioners thousands upon thousands of Clarage Blower Wheels and Assemblies. These smaller units were designed with the same skill characteristic of the larger Clarage equipment — just as carefully constructed — just as carefully tested. And we have sizes to meet ALL REQUIREMENTS — with slow speed operation insuring SILENT PERFORMANCE. May we have your next inquiry?

SPECIFY CLARAGE for
COMPLETE AIR CONDITIONING
VENTILATION
HEATING
COOLING
MECHANICAL DRAFT
FANS & BLOWERS FOR INDUSTRIAL NEEDS

CLARAGE FAN COMPANY • Kalamazoo, Mich.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

● Each month, Econ-O-Col makes available to dealers a compact, easy-to-work program that swings into immediate action. Each month's program is *complete* with tested selling ideas, backed by mailers, displays, newspaper ads and general suggestions. Dealers make money EVERY month, not just at a "peak" season. If you want to do business with a firm that *knows* what dealers need, then *does something about it,* write or wire today for details on the money-making Econ-O-Col franchise!

ECONOCOL COAL BURNER

ECON-O-COL

The "Stronghearted" Stoker

MANUFACTURED BY COTTA TRANSMISSION CORPORATION, ROCKFORD, ILLINOIS

silicon and nickel would possess exceptional advantages in this respect. This is true in general, but the combination of silicon and nickel in copper produces a precipitation hardening alloy which has to be handled quite differently from the cupro-nickels or the silicon-copper alloys.

Nickel added to the copper-zinc alloys to form the familiar and useful series of nickel-silvers contributes to the strength, corrosion resistance and weldability with no complications such as are encountered with the nickel-silicon combination. Thus the nickel-silvers are exceptionally good resistance-welding alloys.

Cupro-nickel is in some respects more difficult to fusion weld than the copper-silicon alloys. At welding heats, the closely clinging, highly refractory nickel oxide forms on the surface of the metal. This oxide is more difficult to displace or dissolve with a flux than the oxide of any of the more common metals, with perhaps the exception of chromium.

Tin

Copper alloyed with tin, the bronze of the ancient and modern times, is a very good resistance welding alloy. In point of resistance weldability, the copper-tin alloys offer less difficulty than the copper-zinc brasses. While tin by itself melts at 450° F., its boiling point is very high, being 4100° F. Hence, there is no trouble due to volatilization as there is with zinc.

In fusion welding, the copper-tin alloys melt with a bright surface and what little oxide forms is easily fluxed off. The metal is, however, more or less hot short and precautions must be taken to avoid hot working the metal too much in welding operations or offering restraint to its shinkage from a fusion heat.

The copper-tin alloys require a deoxidizer. Zinc is sometimes used, but phosphorous, being more active, is more common. Hence the name "Phosphor Bronze."

Phosphorous

The addition of phosphorous to the tin-bronzes or to copper alone is beneficial for a resistance welding material in that it depresses the electrical conductivity very rapidly. However, in the small percentages in which it can be used, 0.03% to 0.50%, it contributes little to the strength. In larger proportions, phosphorous cuts the ductility of the copper alloy too much.

Moreover, phosphorous in any appreciable amount increases the tendency of the copper electrodes to "pick-up" metal from the sheet. Hence, it is unlikely that phosphorous will ever play a greater rôle in resistance welding alloys than that of a deoxidizer.

Aluminum

The aluminum-copper alloys, known as "aluminum bronzes," may in some future time occupy a higer place than is accorded them in Table 1. They have good ductility hot and cold, moderate an-

Only THE
COOK HEAT CONTROL
Gives You All These Features

1. Easy to Install
2. Needs no Service
3. Current Failure Safety Feature
4. Automatic Clutch Prevents Smoke-back
5. Quiet Vapor Motor
6. Attractive Design

Write today for detailed information

COOK CONTROLS
THERMOSTATS—FURNACE LIMIT CONTROLS
ZONE CONTROLS—BLOWER CONTROLS
COOK ELECTRIC CO.

2714 Southport Ave. Chicago

PREMIER FURNACE CLEANERS
—For a Real Clean-up!

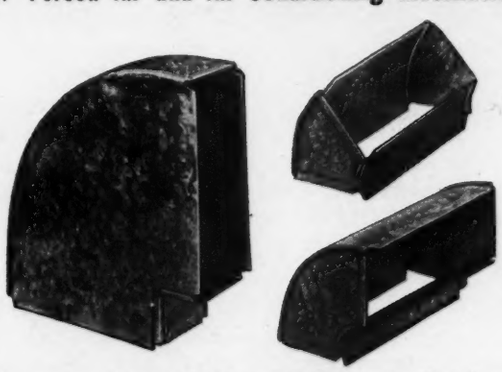
You're all set to "clean-up" right when you buy Premier! Weighing less than 50 pounds, they are one-man cleaners and have been the furnace man's favorite for years. Premier Cleaners are ideal for upstairs use and may be used independently from the container for suction and blowing use in cleaning air ducts, registers, grilles, radiators and air conditioning equipment.

New Improved Models—Completely Equipped
5/8 Horsepower $69.50
1 Horsepower $89.50

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Road · Cleveland, Ohio

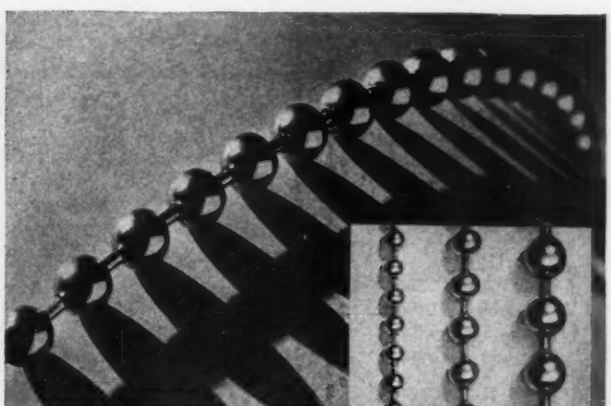
AJAX

A NEW LINE OF
PREFABRICATED DUCTS and FITTINGS
for Forced Air and Air Conditioning Installations



Our Catalog "A" (Gravity Fittings), Catalog "B" (Forced Air Fittings) are yours on request.

THE CINCINNATI SHEET METAL & ROOFING CO.
Furnace Fitting Department
230 E. Front St. Cincinnati, Ohio



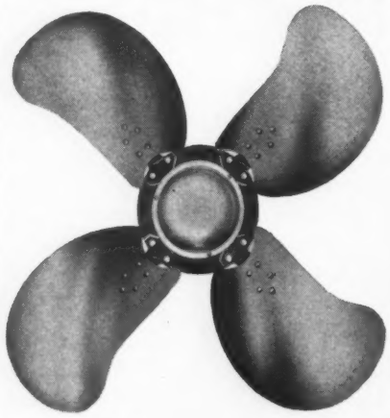
The three sizes of BEAD CHAIN* illustrated here are widely used for and with sheet metal products.

BEAD CHAIN*
is made of varied metals, including Monel, in natural, polished and plated finishes, with attachments and couplings for many needs.

BEAD CHAIN
ESTABLISHED 1914
Trade Mark Reg. U.S. Pat. Off.

25 years of constant development has resulted in many practical and ingenious uses for BEAD CHAIN* with quality products. We will cordially cooperate with manufacturers to develop new assemblies where the use of chain is desirable.

THE BEAD CHAIN MANUFACTURING CO.
*Reg. U. S. Pat. Off. 8 Mt. Grove Street, Bridgeport, Conn.



FAN BLADES

TYPES Attic, Exhaust, Pedestal —direct or belt drive.

- Die stamped and formed steel blades
- Perfect balance and alignment
- Greater volume of air per watts consumption
- All sizes 19" to 60", 2-3-4-6 blade
- Graceful, Well Designed

WM. J. LOHMAN, Inc.
62 Ninth Ave., New York, N. Y.
Write today for further information and samples.

ALLEN TURBINE VENTILATORS

"Best looking ventilator in Americal" is the comment frequently heard, of this famous Allen Coni-Vane Turbine. Its efficiency and long life are widely known.

Best in LOOKS too

When installing ventilating equipment on industrial plants, you can depend on permanence if the precision-built Allen goes on the roof.

Allen Turbine Ventilators are made in a complete line of sizes and models. Our engineering department will supply their counsel, without obligation, to assist you in specifying proper equipment. Let us send our catalogs for your file.

The Allen Corporation
9752 Erwin Ave., Detroit, Michigan

nealed strength responding rapidly to cold work and very good resistance weldability.

The aluminum bronzes retain their hardness up to red heat better than most copper alloys. Furthermore, on being heated the aluminum forms a thin, almost colorless, closely clinging oxide on the surface of the metal which protects it from further oxidization. It, therefore, remains bright after long periods of heating.

The resistance weldability of the 5% and the 8% aluminum bronzes is very good. The electrical conductivities are higher than for the silicon-copper alloys, but they are still low enough to make it possible to weld such sheet with the usual welding transformers. The coating of aluminum oxide is not thick enough to seriously interfere with the resistance welding of the 5% alloy and even with the 8% alloy it gives little trouble. In oxyacetylene welding, however, the aluminum oxide film does interfere with the flow of the metal, particularly with eight or more per cent of aluminum. The 5% aluminum bronze can, however, be satisfactorily welded with the torch or the arc.

Beryllium

This element alloyed with copper to the extent of 1½% to 2% has a profound influence on the tensile strength, hardness, resilience and rigidity of the metal. The tensile strength of the soft metal is 70,000 pounds per square inch with a high degree of ductility. In this condition it can be cold worked or shaped to any required extent. A precipitation heat of 275° C. (527° F.) will increase the strength greatly. Thus with cold rolling, followed by the precipitation treatment, a tensile strength of 190,000 pounds per square inch may be developed.

In a manner quite similar to the aluminum in aluminum bronze, a thin, closely clinging oxide of beryllium will form on the surface of beryllium copper when the metal is heated. This oxide is extremely refractory and insoluble in most fluxes. Hence, oxyacetylene fusion welding of this material is practically out of the question, though, by keeping the metal covered with flux, satisfactory brazing and silver soldering can be done.

The beryllium copper may be carbon arc welded if the operation be carried on at sufficient speed to forestall interference from the beryllium oxide. As an illustration, we found that by using a $\frac{5}{16}$-in. diameter carbon electrode with a current of 225 amperes and an arc length of ⅛ to ¼ in. melting a $\frac{5}{32}$-in. diameter beryllium copper welding rod at approximately 1 in. of rod per inch of weld, we could obtain an excellent weld in ⅛-in. thick beryllium copper sheet. The edges were given a 45° bevel to make a 90° single vee groove. The plates were clamped to a copper backer. No flux was required. The metal flowed together under the thin, tough, refractory skin of beryllium oxide with excellent soundness and strength. Welded strengths of 160,000 pounds per square inch have been obtained by this method in a peened and heat-treated sample which is, we believe, the highest

Broaden your Furnace Repair Business with FIRELINE

With a few drums of Fireline on hand you can handle any firepot emergency on a moment's notice—you can repair any broken or cracked firepot (right through the firedoor if necessary), can replace cracked or fallen fire brick in steel furnaces, can repair hearths in oil burner or stoker jobs, or give new firepots an efficient refractory lining that will protect them against burning out indefinitely.

Fireline is the new plastic fire brick material that is installed completely around firepot walls. It sets with an ordinary fire into a gas-tight, one-piece fire brick lining. It is so inexpensive that you can repair a burned-out firepot for half what you must charge to install a new one, AND STILL MAKE ABOUT THE SAME PROFIT on the job.

Write for installation data, prices and dealers helps.

Fireline steps up furnace capacity and efficiency. Burns smoke, gas and soot, cuts coal bills from 10% to 20%. Seals cracked or broken firepots.

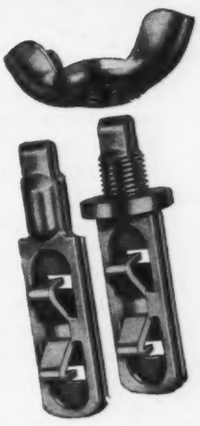
FIRELINE STOVE & FURNACE LINING CO.
1866J KINGSBURY ST., CHICAGO, ILL.

JUST A LITTLE FELLOW IN SIZE BUT A GIANT FOR CUTTING COSTS

If you are not already using the E-Z-ON damper regulator, we believe you are NOT operating at MAXIMUM EFFICIENCY and ECONOMY.

DON'T TAKE OUR WORD FOR IT...

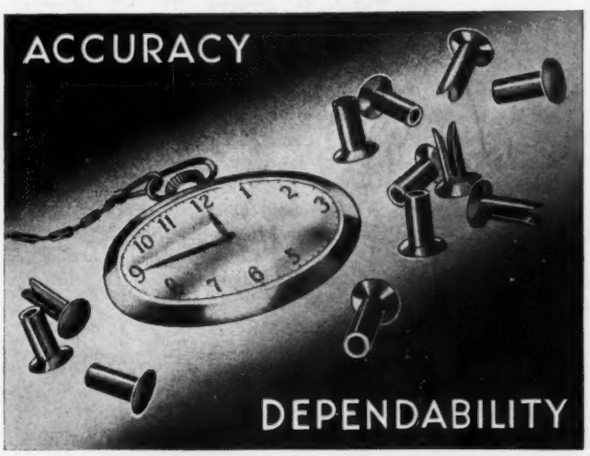
Get your FREE sample E-Z-ON damper regulator at once, and CONVINCE YOURSELF.

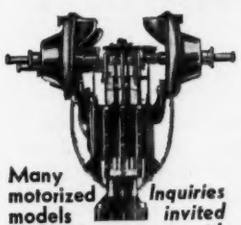


SAVE 33% to 50% time cost. USE ONLY A HAMMER for application. Eliminate HOLE PUNCHING . . . RIVETS . . . SCREWS. Assure TROUBLE-PROOF, RATTLE-PROOF, RUST-PROOF job.

Send us your jobber's name and we will send you a sample E-Z-ON Damper Regulator. Write

M. A. GERETT CORPORATION
2945 N. 30th St.
MILWAUKEE, WISCONSIN





Many motorized models available in single stroke and multiple drive

Inquiries invited with samples of work you wish to do

when PRECISION counts —

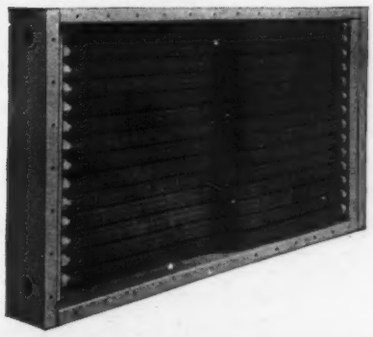
There is one item in your specifications you can decide upon without hesitation—T R & S Rivets. T R & S quality means every rivet, no matter how many thousands you need, is usable; rivets of uniform preciseness, accurately gauged to drive with smoothness, to clinch with non-brittle efficiency. We have solved the riveting problems of America's leading industrial concerns.

TUBULAR RIVET & STUD CO.
World's Foremost Producers of Rivets
WOLLASTON MASSACHUSETTS

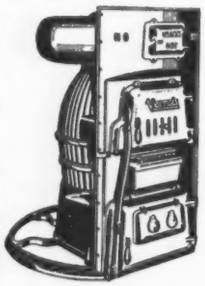
G&O RADIATION FINNED COILS

G&O FINNED RADIATION COILS for all industrial applications are available in a wide range of sizes, for high and low pressure operation.

SEND FOR CATALOG



THE G&O MANUFACTURING COMPANY
New Haven, Connecticut
Pioneer Manufacturers of Square Finned Tubing in the United States



GRAVITY JOBS MEAN "MONEY IN THE POCKET" FOR YOU!

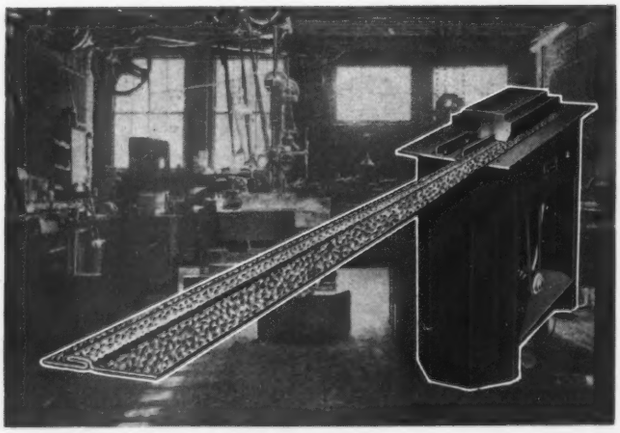
Gravity heating is still the largest part of the warm air business and a heavy dependable furnace like the "VERNOIS" will help you get your share of it.

VERNOIS furnaces are constructed of "Vernalloy," the metal famous for its "Hell on Earth" tests, and once installed they will perform season after season with little if any attention.

Make plans now to pocket extra dollars this Fall with gravity heating jobs. Line up with Mt. Vernon. Write today for further information.

Vernois
FURNACES

MT. VERNON FURNACE & MFG. CO.
Mt. Vernon Illinois



Modernize,—and save labor, increase profits with LOCKFORMER Equipment. Over 500 shops since January 1st 1939 are added satisfied users of LOCKFORMER 22. Many hundreds of shops are also equipped with LOCKFORMER 18, LOCKFORMER POWER FLANGER, and EASY EDGER.

Now liberal time payment plan puts all LOCKFORMER products within the means of any shop. See your supply dealer or jobber for full particulars.*

**Dealers write for profitable sales plan.*

THE LOCKFORMER COMPANY
4632 FLOURNOY STREET CHICAGO, ILLINOIS

strength obtained to date in a copper alloy fusion weld.

Starting with the clean metal, beryllium copper can be readily resistance welded. While placed in the order of second preference for resistance welding, further work may enable one to give it an "excellent" rating. Thus there are a number of different conditions in which the metal can be welded, (1) in soft, annealed state, (2) in the cold rolled condition, (3) after annealing and heat treating or (4) after cold rolling and heat treating. Similarly, the assembly may be annealed and heat treated after welding or simply given the precipitation heat. Ordinarily a resistance weld cannot be cold worked, though such treatment would be beneficial. Only a few of these procedures have been evaluated for resistance welding to date.

[Part 2 will follow]

◆

Furnace Capacity And Fuel Consumption

(*Continued from page* 42)

to do with a stoker, since the capacity is a direct function of the volume of air passed over the heating surface at a given combustion rate and, while the stoker may put more heat into the castings, it can not be carried away excepting as higher register air temperature unless the air volume of the furnace is increased. The University of Illinois, in testing oil burning furnaces (conversion type) showed that with any given quantity of air passing over the furnace, the capacity in Btu per hour increases as follows:

At 1600 cfm, the capacity is 100,000 Btu at 7.04 gallons of oil per hour; 118,000 Btu at 8.65 gallons; 128,000 Btu at 9.66 gallons.

These increases in capacity are, no doubt, the figures which the stoker people are using, and yet we hesitate to give these an arbitrary set of capacity increases.

You should remember that there is considerable difference in the performance characteristics of oil-firing as compared to stoker-firing and if you want exact increases, we suggest you address a letter to Professor A. P. Kratz, Engineering Experiment Station, University of Illinois, Urbana.

◆

Toledo Plan for Apprenticeship

The apprentice training school, operated under the Toledo Plan, was established in October, 1936. At the beginning, young men, ranging in experience from beginners to those having had several years experience were debentured by the several shops. Since then, only beginners have been admitted.

Thus far, only eight journeymen have been graduated. Two classes of four each.

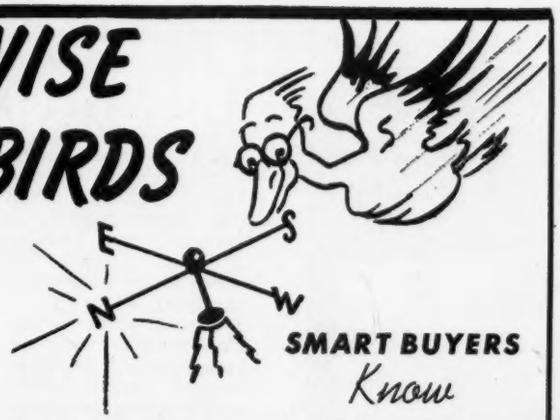
The school is operated on Saturday forenoon, from 8 to 12 o'clock. The boys attend on their own time. Some manufacturing plants have apprentices entered in regular week day classes and some of them pay them full time for attending school.

The Toledo Sheet Metal and Roofing Contractors Association, Inc., has published a booklet which shows the setup between the association, the Board of Education and the Sheet Metal Workers' Union—Local No. 6. The local limits the number of apprentices to one to every four journeymen.

At the present time the average age of journeymen in Toledo is around 45 years, and about 10 percent are between 50 and 65 years.

Copies of the booklet are available.

WISE BIRDS



SMART BUYERS *Know*

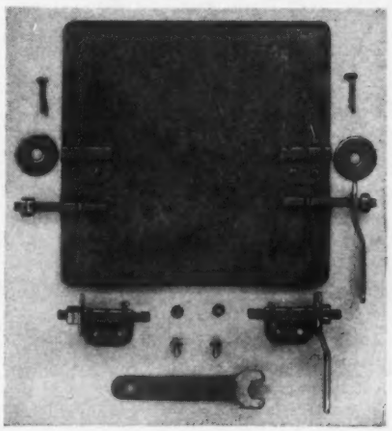
That the ideal time to make furnace repairs and new installations is during the spring and summer months. Then they're not caught short when cold weather comes again.

LACLEDE FURNACE CEMENT is preferred by those in the know because it Dries Faster, Sets Stronger, Lasts Longer. Won't disintegrate during long periods of non-use. And when subjected to high heat it's there with strength to spare.

LACLEDE-CHRISTY *St. Louis*

New! **LACLEDE FIREZIST PLASTIC LINING**
hand moldable plastic refractory for furnaces, oil burners, stokers, etc. *Write for literature.*

K-B DAMPER CONTROL



Extra Special Prices

TO INTRODUCE THE NEW

K-B DAMPER CONTROL

TO THE TRADE

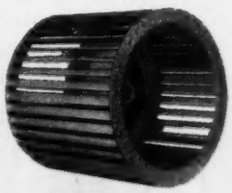
The following orders are F. O. B. Cincinnati, Ohio. All orders under $5.00 to have check or goods will be shipped C. O. D. Accounts will be opened with firms having satisfactory rating. All prices subject to Federal or State tax and to change without notice.

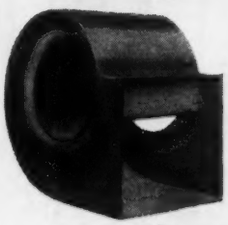
No. 100	Standard	$0.15 per set net
No. 100½	For ½" insulating	.20 per set net
No. 101	For 1" insulating	.23 per set net
No. 101½	For 1½" insulating	.26 per set net
No. 102	For 2" furring	.28 per set net
No. 103	For 3" furring	.28 per set net
No. 105	For 5" furring	.35 per set net
No. 107	For 7" furring	.40 per set net

Longer than No. 107 add 4c per inch.
Rods ¼". All parts cadmium plated.

G. L. KERENTOFF
2803 Jefferson Ave., Cincinnati, Ohio

BLOWER — WHEELS — HOUSINGS — ASSEMBLIES





LOW HORSEPOWER
QUIET OPERATING
SINGLE and DOUBLE INLET
FOR
AIR CONDITIONING FURNACES
UNIT AIR CONDITIONERS
STOKER and OIL BURNERS
CIRCULATING UNITS
ATTIC VENTILATORS

A COMPLETE LINE OF

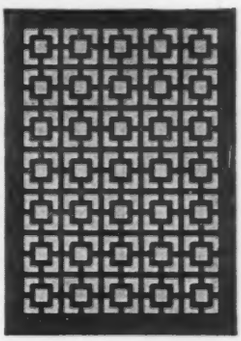
SQUIRREL CAGE, PROPELLER AND STREAMLINE FANS
AIR CONDITIONING BLOWERS
AIR WASHERS—UNIT HEATERS
FURNACE BLOWERS AND
STEAM SPECIALTIES.

ESTABLISHED IN 1879

THE BISHOP & BABCOCK MFG. CO.
CLEVELAND, OHIO
REPRESENTATIVES IN PRINCIPAL CITIES

PERFORATED METALS

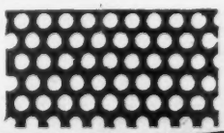
Many designs of Perforated Metal for Architectural Grilles, Radiator Enclosures, Air Conditioners, Cabinets, Safety Guards, and for all screening and sizing operations.



Steel, Stainless Steel, Brass, Bronze, Copper, Monel, Aluminum, Zinc and other metals or materials perforated to your order.

Round holes from .020" to 7". Slot holes from .008" to 3" wide. Square holes of standard sizes. Complete line of brass and tin in small sizes. Prompt Service—Pleasing Prices.

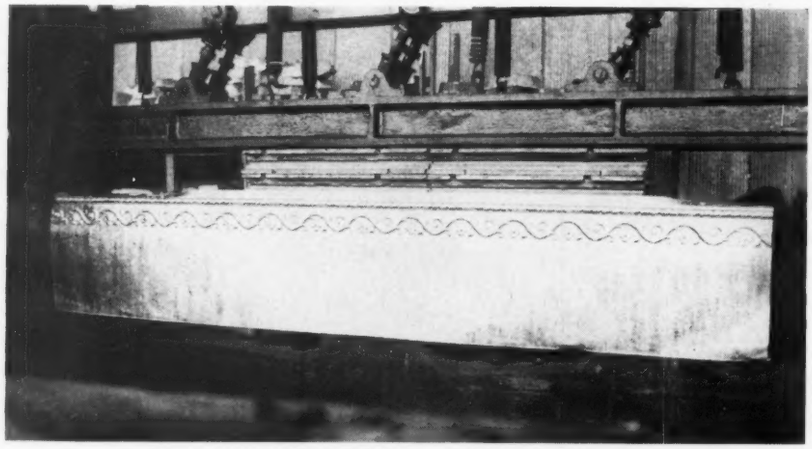
Send us your next specifications.



(Note: Equally spaced holes make for uniform strength, improved appearance and durability.)

The Harrington & King PERFORATING CO.
5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

Ledkote Specializes in Leadcoating (*Continued from page 69*)



Another view of the ornamented gutter section in the toggle press. The ornamentation is stamped by Ledkote Products. After the ornamentation is stamped, the sheet is formed into the gutter section. Ledkote Products offers a complete line of ornamented gutter heads, straps, gutter sections, conductor pipe and combination sets—all in standard designs and shown in a catalog.

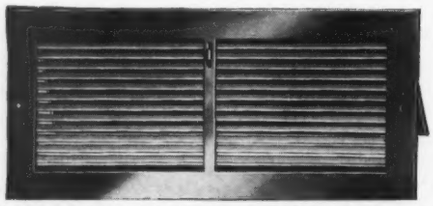
for attachment. The bay, as a whole, will include 50 separate pieces to make up work 24 ft. high by 17 ft. 6 in. wide. A. A. Green, sheet metal contractor, of Mt. Vernon, N. Y., is assembling the panels on location by clips onto oak framing, thus making a "floating" panel group to compensate for weather exactions.

Another order under way in the 25,000 sq. ft. of factory area occupied in L. I. City, is a contract wherein the New Rochelle Roofing Co. will erect a bay and lead shield spandrels for a Girls' College in their city. The work includes three spandrels of sheet lead onto which stamped shields have been attached by burning. The basic metal will be attached to the structure by clips to wood framing to allow for expansion and contraction. Spandrels also were clipped together. Also in this order is a 16-ft-long lead sheeting background onto which a long inscription of cast lead letters, each 6-in. high, are to be attached by burning.

In another department of the Ledkote Products Co. plant is a plaster model of an American Eagle some 7 ft. high. This was used for stamping the finished product. It is thus indicated that such a fabricating plant must incorporate many departments such, for instance, as modeling, drafting, machine, processing, foundry, shearing, braking, finishing, dipping, dry rooms.

NEW
AIR CONDITIONING REGISTERS

The New Rock Island line of Air Conditioning Registers now shown in complete new catalogue just off the press.



No. 822 Wall Register---Horizontal Vanes

The New Rock Island Air-Vane Registers are of bar type fabricated construction—Attractive Appearance—Rigid Construction—Vertical or Horizontal Vanes—Simple, secure adjustment.

New Catalogue and Dealers Net Estimating Book, a time and money saver, gives full particulars, prices, etc.

Mail Coupon Today

ROCK ISLAND REGISTER CO.
Rock Island, Ill.

Mail me a copy of your new catalogue and dealer's net estimating book.

Name .....

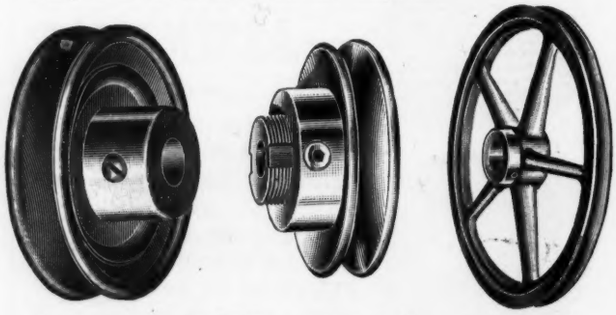
Street Address .....

City & State.....

Bring Your F. H. P. Transmission Problems to

M A U R E Y

MAUREY Pulleys are designed and made by engineers who are thoroughly familiar with the many applications for V-Pulleys. They have an enviable reputation for sturdy dependability under the severest tests and daily use.



MAUREY STEEL PULLEYS are **not** the light stamped type with die cast hubs that cause constant replacement of belts. They are made of heavy steel sections with heavy rolled edges and hubs machined from bar steel or malleable iron. That is the reason MAUREY Steel Pulleys give long, trouble-free service in installations of Stokers, Fans, Blowers, Air Conditioning and Refrigeration units.

VARIABLE PITCH PULLEYS of solid steel construction. Speed adjustment of as much as 30%. Fine, accurate milled threads, 20 to the inch assure close adjustment. For Air Conditioning Units. Made in 4 sizes—3¼" to 4½" O. D.

MAUREY CAST IRON PULLEYS are made on a new principle of design that permits a freer flow of air through spokes. They are much sturdier than cast iron pulleys of the usual design.

WRITE FOR CIRCULARS AND PRICES

MAUREY MANUFACTURING CORP.
Wabash at 29th, Chicago, Illinois

STAR BRAND

FOR EASIER, BETTER RIVETING

Star Brand Rivets mean faster, smoother going on any riveting job —and assure best results.

Precision manufacture and rigid inspection insure accurate sizes and uniform quality.

Rivets are an important trifle. Use the best—Star Brand—the standard of quality for 76 years.

If your jobber or dealer can't supply you—write direct.

COPPER BRAZIERS AND TINNERS' RIVETS
ROUND, FLAT AND COUNTERSUNK HEADS

★ ALSO SPECIALS FROM
BRASS, BRONZE, NICKEL-SILVER
EVERDUR, MONEL, NICKEL
AND OTHER NON-FERROUS METALS

OTHER PRODUCTS
SCREW MACHINE PRODUCTS
STOVE BOLTS - MACHINE SCREWS
MACHINE SCREW NUTS
Special headed & threaded parts made from wire and rod

BLAKE & JOHNSON CO. Est. 1849
WATERVILLE · CONNECTICUT

6,000,000 HOMES need Furnace Regulators

CASH IN ON THIS PROFITABLE BUSINESS WITH

HOLD-HEET FURNACE REGULATORS

Every one of these six million hand-fired furnace owners is a prospect—and at this low price they can afford Automatic Control. Here is your opportunity. Go after this profitable business—NOW—with HOLD-HEET.

COMPLETE—READY TO INSTALL

This dependable, time tested Regulator provides everything needed for complete furnace control—a practical unit that will give years of economical, satisfactory service. And it comes complete—ready to install—nothing more to buy.

EXTRA PROFITS

Here's extra money for you—easy, quick sales—and a good margin of profit. Now is the time to get it. Investigate, write today for prices and discounts.

Write today for **FREE BULLETIN**

•

GET STARTED **NOW**

RUSSELL ELECTRIC CO.
342 W. Huron Street Chicago, Illinois

"MAINTENANCE MAN 1937— LEADING BUSINESS MAN 1938"

"The Williamson Heater Company
Cincinnati, Ohio
Gentlemen:

You will remember that I was a maintenance man in the railroad shops here up to the first part of 1938 and that, because work was not steady, I thought I would like to try selling furnaces.

Recently our newspaper listed four businesses in this town that showed the best improvement in 1938 and my little business was one of the four mentioned. I am very happy with my agency.

I resigned my job at the railroad and I made more money last year than I ever made working with tools.

Sincerely yours,
XYZ
....., Illinois."

Complete information; name, address of writer of above letter furnished on request. Phone, wire or write The Williamson Heater Company or nearest jobber.

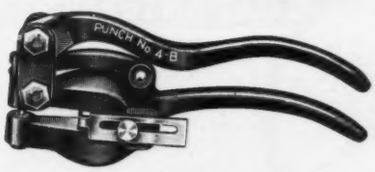
FREE: Complete, easily understood short method for figuring air conditioning jobs. You can complete your figures, price job in one hour flat. Write Dept. 2.

THE WILLIAMSON HEATER COMPANY
Cincinnati, Ohio

TRIPL-IFE · Complete Line Quick Service · FLO-WARM

You can triple your profits with "Tripl-ife"

A REAL *Time Saver*



The No. 4B PUNCH by *Whitney*

This punch is accepted by leading contractors and dealers as a real time-saver in the shop and on the job. Men who use it every day know it can't be beat for clean, fast punching. Has a capacity of ¼" through 16 ga., weighs 3 pounds, 8½" in length, depth of throat, 2". Complete tool includes three punches and three dies of specified sizes with die adjusting key.

W. A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL.

MORE VALUE IN A DOYLE VACUUM CLEANER

Those who know, prefer to buy even a *used* DOYLE rather than buy a vacuum cleaner of some cheaper make. Actually larger motor, wound for lower speeds to insure long life—larger fan, mounted directly on motor shaft—2-inch plus dia. hose with double the area of an 1½ hose,—handling 210 cu. ft. of air per minute at a speed of more than 180 miles per hour. These are only a few of the reasons why a DOYLE is a quality machine throughout that does more work, stays on the job longer and costs less to operate. WRITE FOR THE DOYLE PLAN WHICH SHOWS HOW TO GET MORE BUSINESS EVEN FROM A COLD START.

DOYLE VACUUM CLEANER CO.
227 STEVENS ST., S. W. GRAND RAPIDS, MICH.

PORTABLE SHEARS
ALL-ALLOY

ALL-ALLOY No. 2 cuts up to ¼" steel plate.
ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.
Special blades may be had for shearing stainless steel.
FULLY GUARANTEED
BREMIL MFG. CO. Erie, Pa.

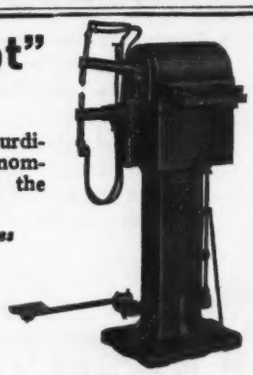
Repair Parts
GUARANTEED TO FIT

BRAUER REPAIR PARTS
STOVE FURNACE BOILER OIL STOVE RANGE

Send all your Repair orders to us. Our enormous stock of Original parts enables us to give you the fastest shipments.

A. G. BRAUER SUPPLY CO.
316 North Third St. • St. Louis, Mo.

ACME "Hot Spot" WELDERS



Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.

Write for literature and prices
Don't Rivet
SPOTWELD!
with an ACME
Lifetime Guarantee!
Complete range of sizes

ACME ELECTRIC WELDER CO.
Distributors in principal cities
5619 Pacific Blvd. Huntington Park, Calif. (Los Angeles County)

Air Resistance In Straight Ducts

(*Continued from page* 51)

12. Davies, L. E. *The Aerologist,* Vol. 8, No. 3, 1932. How to Use the Anemometer.

13. Davies, L. E. A.S.H.V.E. TRANSACTIONS, Vol. 37, 1931. The Measurement of Air Flow Through Registers and Grilles.

14. Eason, A. B. *Flow and Measurement of Air and Gases.* Publishers—Charles Griffin and Company (1930).

15. Eisert, H. A.S.H.V.E. JOURNAL. November 1928. The Resistance of the Flow of Air in Ducts in Relation to Their Size and Shape.

16. Fechheimer, C. J. *A.S.M.E. Transactions,* 1926. Measurement of Static Pressures.

17. Giesecke, F. E. and W. H. Badgett. A.S.H.V.E. TRANSACTIONS, Vol. 37, 1931. Friction Heads in One-Inch Standard Cast-Iron Tees.

18. Hohl, L. L. *Heating, Piping and Air Conditioning,* May 1931. A Diagram for Gas Flow in Pipes.

19. *Journal of Franklin Institute,* November 1911. Data by Pitot, Venturi, and Electric Methods of Flow of Air.

20. Keith, Rafael W. *Instruments,* Vol. 8, 1935. How the Reynolds Number Originated.

21. Kemler, E. *A.S.M.E. Transactions,* Hyd., August 1933. A Study of the Data on the Flow of Fluids in Pipes.

22. Kemler, E. *Heating, Piping and Air Conditioning,* May and June 1933. The Flow of Fluids in Pipes.

23. Kemler, E. *A.S.M.E. Transactions,* Hyd., Vol. 55, 1933. Study of Data on Flow of Fluids in Pipes.

24. Kinealy, J. H. A.S.H.V.E. TRANSACTIONS, Vol. 11, 1905. Flow of Air in Metal Pipes.

25. Kneeland, F. H. *A.S.M.E. Transactions,* 1911. Some Experiences with Pitot Tube on High and Low Air Velocities.

26. Kratz, A. P. and Julian R. Fellows. *Univ. of Illinois Bulletin,* Vol. XXXV, No. 52, February 25, 1938. Pressure Losses Resulting from Changes in Cross-Sectional Area in Air Ducts.

27. Kroeker, J. D. *Heating and Ventilating,* Vol. 28, No. 5, 1931. Chart for Simplifying Calculations of Forced Air System.

28. Kumbruch, H. *Forschungsarbeiten auf dem Gebiete des Ingenieurrwesens,* No. 240, 1921. Pitot Static Tubes for Determining the Velocity of Air. (Translated and published in English in *Technical Memorandums,* National Advisory Committee for Aeronautics, No. 303.)

29. Le Grand, J. A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning,* May 1932. Methods of Reducing Friction Head in Pipe Fittings.

30. Madison and Parker. *Heating and Ventilating,* July and August 1936. (Also in *A.S.M.E. Transactions,* Vol. 58, April 1936.) Pressure Losses in Rectangular Elbows.

31. Marks, L. S. *A.S.M.E. Transactions,* Vol. 56, No. 11, 1934. Ptc-56-2. Air Flow in Fan Discharge Ducts.

32. McAdams, W. H. *Refrigerating Engineering,* February 1925. Flow of Liquids.

33. Moss, S. A. *A.S.M.E. Transactions*—APM 50-3. Measurement of Flow of Air and Gas with Nozzles.

34. Nippert, H. *Power,* June 8, 1930. Reducing Friction Losses in Rectangular Duct Elbows.

35. Ower, E. *Measurement of Air Flow.* Publishers, Chapman and Hill.

36. Patton, T. C. *Heating, Piping and Air Conditioning,* December 1930. New Alignment Chart for Computing the Pressure Drop Due to the Frictional Resistance of a Flowing Fluid.

37. Pigott, R. J. S. *Mechanical Engineering,* Vol. 55, 1933. The Flow of Fluids in Close Conduits.

38. Polson, J. A. and J. G. Lowther. *Univ. of Illinois Bul-*

Step up with GAR WOOD!

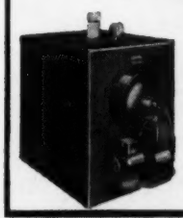
ADVANCED ENGINEERING
EXCLUSIVE FEATURES
PROVED PERFORMANCE
LOWER OPERATING COST

HAVE MADE **Gar Wood** THE NATION'S LEADER

2 NEW UNITS FOR SMALLER HOMES

GAS-FIRED
Tempered-Aire
MODEL 80

A balanced heating and air conditioning machine with exclusive teardrop firebox—fuel economizer, steam-type humidifier, air filters, power-blower and approved gas burner.



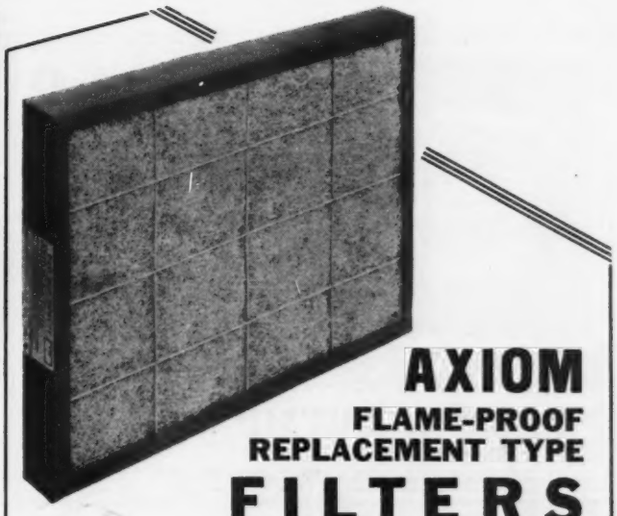
OIL-FIRED
Boiler-Burner Hot Water Heating Unit
MODEL B-120-W

Fired by perfected Model "O" Burner—has small boiler water content, quick boiler pick-up, longer flue gas travel, uses counter-flow principle of heat transfer.

Nothing in a home is more important than a satisfactory heating system. You take no chance with a Gar Wood, for Gar Wood's experience with modern systems has been longest. Whether you build, buy, sell or specify—be guided by Gar Wood's national acceptance and proved performance.

GAR WOOD INDUSTRIES, INC.
AIR CONDITIONING DIVISION
DETROIT, MICHIGAN

CANADIAN DISTRIBUTOR
Engineering Industries, Ltd.
Leaside, Ontario



AXIOM
FLAME-PROOF REPLACEMENT TYPE
FILTERS

Here's a highly efficient, low cost, flame-proofed filter that will enable you to make yourself handsome profits on filter installations. The intake side is made of special Cactus-Fibre which makes possible large dust holding capacity and even build-up. Center section is treated with odorless, non-run oil, flame-proofed. Outlet side made of Hair evenly distributed to trap and hold the finest particles of dust. Available in all standard sizes. Details and quotations on request. Write today.

BLOCKSOM & COMPANY
Michigan City — Indiana, U. S. A.

BENDING BRAKES **WHITNEY-JENSEN** METAL TOOLS

First operation, Elbow Cheek blanked out.

Second (final) operation, Elbow Cheek flanged.

ELBOW CHEEKS — 200 AN HOUR!

With the Whitney-Jensen No. 58 Foot Press, equipped with special blanking and forming dies, Elbow Cheeks can be made 80% cheaper, and far better than by hand.

The HANDIEST Punches for DUCT INSTALLERS Nos. 7, 7½, 8-Imperial Roller Bearing Type.

Clean-cutting, quick-acting, will punch and strip inside 90°. Powerful roller bearing eccentric action. Easy-change punches and dies. Light weight. Capacities, ¼" hole in ⅛", 3/16", and ¼" iron. Widely used with great success by the best sheet metal men.

SEND FOR CATALOG. Whitney-Jensen Catalog No. 13 shows over 80 useful sheet metal working tools. Write for a copy today.

WHITNEY METAL TOOL CO. • 91 Forbes Street, Rockford, Illinois

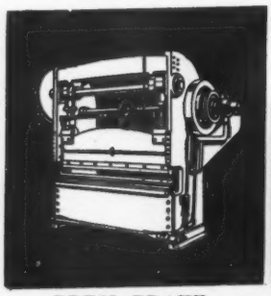
Our Northwest room is terribly cold . . . can you help us?
Sure thing . . . I'll bring up a Victor Heat Booster and get you warm in a jiffy!
FLOOR MODEL Contractor's Cost Only $6.00

WALL MODEL Contractor's Cost Only $8.65

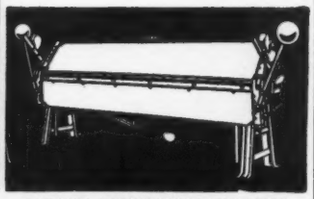
Extra profits . . . contented customers and all for a few minutes' effort. That's what Victor Heat Boosters can mean to you. This ingenious device installed at the register and connected to nearest electric outlet pulls out the cold air "cork" and brings the heat up in a hurry. Quickly corrects such faulty conditions as long horizontal runs—poorly insulated rooms, etc. Ask your jobber today!

VICTOR ELECTRIC PRODUCTS, INC.
3039 Robertson Avenue — Cincinnati, Ohio

VICTOR *HEAT BOOSTERS*



CHICAGO



PRESS BRAKE HAND BENDING BRAKE

Steel Brakes—Presses—Shears

DREIS & KRUMP MFG. CO.

7404 LOOMIS BLVD. CHICAGO

CHECK YOUR WARM AIR HEATING INSTALLATIONS WITH THE

"ALNOR" VELOMETER

This all-purpose air velocity meter indicates air velocities directly and instantaneously on the scale in f.p.m. without the necessity of timing or mathematical calculations. Standard range 0-300, 0-3000 f.p.m. Other ranges available up to 18,000 f.p.m.

Write us today for a folder giving more complete information.

ILLINOIS TESTING LABORATORIES, INC.

412 N. LaSalle Street Chicago, Illinois

SELL MORE FURNACES with this NEW LOW PRICE Breuer's Ball Bearing TORNADO

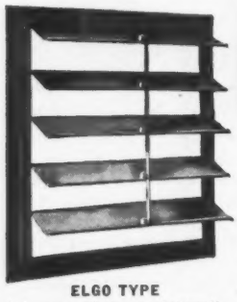
Furnace and Boiler Vacuum Cleaner

Not only does it excel in furnace and boiler cleaning, but it puts you directly in touch with the furnace and repair needs of your customer. Not a converted household cleaner, but DESIGNED FOR THE JOB. Complete set of necessary attachments.

Ask for FREE SALES PLAN and Demonstration

BREUER ELECTRIC MFG. CO.

5062 N. Ravenswood Ave. Chicago, Illinois



ELGO TYPE

Get our prices on Automatic Shutters, Stationary Shutters, Hand Operated Shutters, Ceiling Dampers, Balanced and Back Draft Dampers.

Elgo Ventilating Specialties

Tight-Fitting Automatic Shutter

Weatherstripped on inner edge, instead of on outer edge, assuring a snug, tight fit when the shutters are closed. Unusually sensitive to air currents. And besides, it has a swivel-joint with a hardened steel bushing which never wears loose or rattles. Sizes from 10" to 60" square—also rectangular.

Write for Circular and Prices!

ELGO SHUTTER & MANUFACTURING CO.

634 W. Warren Detroit, Mich.

Free CATALOG

Air Resistance In Straight Ducts

(*Continued from page* 112)

letin, No. 240. (Engrg. Experiment Station), 1932. The Flow of Air Through Circular Orifices in Thin Plates.

39. Prandtl, L. and O. G. Tietjens. Translated by L. Rosenhead. *Fundamentals of Hydro- and Aeromechanics.* Published by McGraw-Hill Book Company.

40. Prandtl, L. and O. G. Tietjens. Translated by J. P. Den Hartog. *Applied Hydro- and Aeromechanics.* Published by McGraw-Hill Book Co.

41. Reynolds, Osborne, *Scientific Papers,* Vol. II. Published by Cambridge Univ. Press, Cambridge, England, 1901.

42. Schutt, H. C. *A.S.M.E. Transactions*—HYD 51-10. Losses of Pressure Due to Sudden Enlargement of a Flow Cross-Section.

43. Smith, Edw. S., Jr. *Instruments,* Vol. 8, 1935. Alternative Forms of the Reynolds Number.

44. Spitzglass, J. M. *A.S.M.E. Transactions,* Vol. 44, 1922. Orifice Coefficients.

45. Stacey, A. E., Jr. A.S.H.V.E. TRANSACTIONS, Vol. 27, 1921. Resistance of Several Materials to the Flow of Air.

46. Standard Test Code for Centrifugal and Axial Fans. A Report of the Joint Engineering Committee of the *National Association of Fan Manufacturers* and the Fan Test Code Committee of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS Published by the *National Association of Fan Manufacturers.* Bulletin No. 103, July 1938.

47. Van der Pyl, Lymen. *Instruments,* Vol. 8, 1935. The Flow of Fluid in Pipes.

48. Willard, A. C. *The Technograph,* March 1925. Research Results on Heating and Ventilation.

49. Willard, A. C. and A. P. Kratz. A.S.H.V.E. TRANSACTIONS, Vol. 36, 1930. Friction Losses and Observed Static Pressure in a Domestic Fan Furnace Heating System.

50. Wirt, Loring. *General Electric Review.* June 1927. New Data for the Design of Elbows in Duct Systems.

51. Waters, E. O. *Yale University Thesis.* 1914. Flow of Air Through Pipes and Orifices.

Three Types of Heat Conservation

(*Continued from page* 55)

75 per cent, or the total loss by 33 per cent.

2. Weatherstripping of windows and doors will reduce heat loss through window and door crack by 30 to 70 per cent, or 6 to 15 per cent of the total heat loss, depending on how well built the window is.

3. Storm sash and double-glazed windows will reduce the heat loss through average windows by about 60 per cent, which represents 16 per cent of the total heat loss.

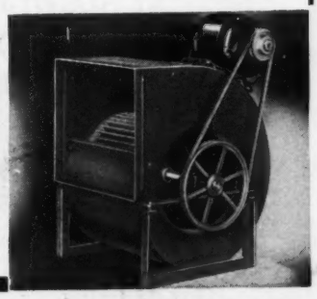
4. Four inches of mineral wool installed in lower floors will reduce the heat loss through them by 75 per cent, or the total heat loss by 6.6 per cent.

These figures may serve as a general guide to the home owner planning to install one or more heat stops in his home. His final judgment should be weighted, however, by not only these percentages, but by reference to the structural condition and exposure of his house. In this way, he may determine his precise insulating needs.

UTILITY

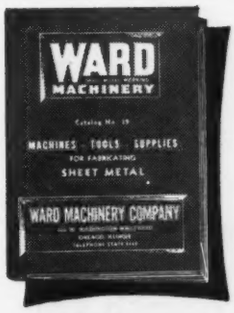
BLOWERS

Dynamically balanced, self-aligning bearings, die-formed, baked enamel finish, single or double inlet.



UTILITY FAN CORP

2528 Santa Fe Ave., Los Angeles, Calif.
122 E. 42nd St., New York, N. Y.

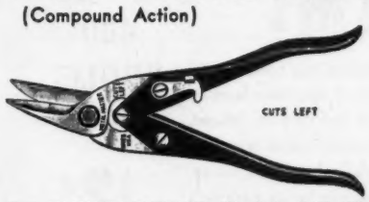


Have You the New 1939 Ward Catalog?

Devoted entirely to machines, tools and supplies for fabricating sheet metals exclusively. If not write us today.

WARD MACHINERY CO.
564 W. Washington Blvd., Chicago, Illinois

WISS "METAL-MASTER" SNIPS
(Compound Action)



"TWICE THE WORK WITH HALF THE EFFORT"

TWO MATCHED PATTERNS M1 (Cuts Left) M2 (Cuts Right) Cut circles, squares and any irregular patterns on Stainless, Dural and Monel Metals with the greatest of ease. Jaws of wear-resisting Manganese Molybdenum Steel. Handles hot-pressed from tough Chrome Vanadium Steel. Nickel steel bolts and nuts to Government specifications. All parts interchangeable. Detachable rubber handle grips at slight extra cost.

J. WISS & SONS CO.
ESTABLISHED 1848 NEWARK, N. J.

Tune in for PROFITS on Furnace Cleaning Time
with Schaefer Flue and Furnace Brushes

Savings your customers enjoy with clean furnaces will more than pay for these new SCHAEFER FLUE AND FURNACE BRUSHES. Put these attractive and serviceable Brushes on prominent display—they'll practically sell themselves, with their sparkling, brilliant RUSTPROOF Steel Bristles and handles. They wear from 4 to 6 times longer than other brushes—and clean much better and easier.

Write for your story of Furnace Cleaning Profits. Tie in on this story early—for higher Summer, Fall and Winter Profits!

SCHAEFER BRUSH MFG. COMPANY
117 W. Walker Street, Milwaukee, Wisconsin

SCHAEFER BRUSHES
BUY SCHAEFER-IT'S SAFER

WANT A REAL STAINLESS STEEL SOLDERING FLUX?

Ruby's Stainless Steel Soldering Flux has proven a "God Send" to fabricators. After several years of laboratory tests and in actual use, this marvelous flux has proven that the soldering of stainless steel is possible and comparatively easy. No special equipment needed; or no nauseating after effects. Write for details or order from your jobber. Available in pts., qts., gals.

RUBY CHEMICAL CO.
74 McDowell St. Columbus, O.

Rubyfluid

A Real "SENSATION" for FALL SELLING SEASON...

You've never seen a furnace like this at such an attractive price before. Incorporates every modern improvement in design for beauty, efficiency and economy. Equipped with silent powerful blower, filters and automatic controls. Burns any solid fuel. Stoker or hand firing. Get all the amazing facts about "The Sensation", and other Peerless units. Every size and type of heating and winter air-conditioning plant for completely automatic operation, using all kinds of fuel. Peerless dealers are making more sales and profits than ever before. Write for literature and proposition.

PEERLESS FOUNDRY CO., 1853 Ludlow Ave., Indianapolis, Ind.

MISTER FURNACE MAN

stop your smoke complaints by using NU DRY FURNACE CEMENT when setting up your furnace jobs.

Because—

It does not crack, bloat, or powder when furnace is fired immediately after applied. Takes less material to set a furnace.

Will not shrink and keeps joints tight. No loss because it will not harden in container.

Send for full information.

THE PYROLITE PRODUCTS CO.
1221-31 W. 74th St., Cleveland, O.

Get Faster Iron Heating and Heat Treating with Johnson's 501 Bench Furnace

Experienced shop men tell you this is the best furnace for heating soldering coppers up to 6 lbs., and for heat treating small metal tools and parts. Patented Johnson Direct Jet Burner gives intense heat and perfect combustion economically with any type gas. No blower, forced air draft or muffle needed. This simple, ruggedly designed unit has proved its ability to give years of satisfactory, low cost service. Write today for your FREE catalogue!

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

JANUARY 1940 . . .

will be a *BIG* month for the Industry

American Artisan's Annual Directory and Show Number will be issued about January 15th

AMERICAN ARTISAN
6 North Michigan, Chicago, Ill.

★ COURTEOUS SERVICE
★ GENUINE HOSPITALITY
★ LUXURIOUS SURROUNDINGS
IN
DAYTON
OHIO

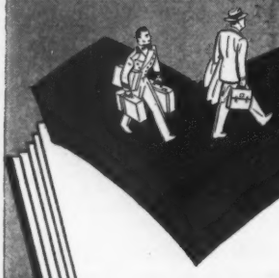
SECOND AND LUDLOW STREETS
HOTEL
MIAMI

★ You'll appreciate the comfort and superior facilities at Dayton's leading hotel – the smart and colorful Miami, first choice of experienced travelers. Spacious, tastefully furnished rooms. Internationally famous for its excellent food. . .Popular Crystal Bar.

400 ROOMS WITH BATH
FROM $2.50

V. C. MURPHY, MANAGER
ONE OF THE ALBERT PICK HOTELS

Check In
AT DE WITT OPERATED HOTELS



The Hotels that Check with Every Travel Standard

In Cleveland · HOTEL HOLLENDEN
In Columbus · THE NEIL HOUSE
In Akron · THE MAYFLOWER
In Jamestown, N. Y. THE SAMUELS
and THE JAMESTOWN

Theodore De Witt, President
R. F. Marsh, Vice-President

DE WITT OPERATED HOTELS

★ ★ ★ ★ ★

BELLEVUE-STRATFORD
IN PHILADELPHIA

★ ★ ★ ★ ★ ★ ★ ★ ★

Its distinguished atmosphere attracts persons and events of genuine importance from all over the world. Famous cuisine, unexcelled service, moderate rates.

Include Historic Philadelphia in Your Itinerary

(Air-Conditioned Restaurants)

CLAUDE H. BENNETT, *General Manager*

SERVICE SECTION: Rates—$5.00 per inch per insertion. One inch minimum. CLASSIFIED SECTION: 5 cents for each word including heading and address. Count seven words for keyed address. $1.00 minimum. Cash must accompany order.

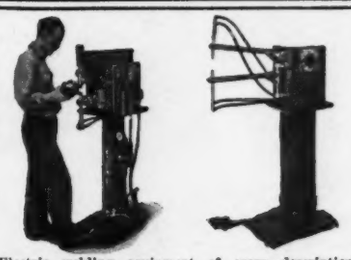
AMERICAN ARTISAN Service Section

CUSTOM FABRICATION
OF ALL ALLOYS
STAINLESS-MONEL-COPPER, ETC.

Custom fabrication of all alloys with satisfaction guaranteed. Send blueprints for prices and delivery. Years of experience guarantee responsible and accurate work. TERMS CASH WITH ORDER. Write today for further information.

RIESTER & THESMACHER COMPANY
SHEET METAL PRODUCTS
1526 W. 25th St., Cleveland, O.

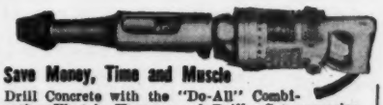
LEARN
SHEET METAL WORK
and
PATTERN DRAFTING
in
America's Oldest Trade School
An endowed institution, not operated for profit.
Term begins Sept. 5th. Send for catalogues.
NEW YORK TRADE SCHOOL
322 East 67th Street New York City



Electric welding equipment of every description to weld from a watch case to a door. Special or standard SPOT WELDERS from ¼ to 500 K.V.A. We invite contract Spot Welding in large or small quantities.
EISLER ENGINEERING COMPANY
CHAS. EISLER, PRES.
761 S. 13th St. (Near Avon Ave.) Newark, N. J.

STRAIGHT—CIRCULAR—IRREGULAR CUTTING OF SHEET METAL

BEVERLY cuts flat to any size or shape. Three sizes: No. 1, weighs 16½ lbs.; cuts up to 14 gauge. No. 2, weighs 32 lbs., cuts up to 10 gauge. No. 3 weighs 55 lbs., cuts up to 3/16 gauge.
Write for circulars and prices.
BEVERLY THROATLESS SHEAR CO.
3004 W. 111th St. Dept. 2 Chicago, Illinois



Save Money, Time and Muscle
Drill Concrete with the "Do-All" Combination Electric Hammer and Drill. Set expansion bolts 10 to 20 times faster than with hand tools. Drills concrete, brick, stone, metal, wood. 2 tools in 1. Easy to maintain—Pays for itself. Bulletin No. 381.
WODACK ELECTRIC TOOL CORPORATION
4644 W. Huron St., Chicago, Ill.

JOHNSON'S
NEW HANDY MANUAL
on
HEATING, VENTILATING
MECHANICAL REFRIGERATION
and
AIR CONDITIONING
432 pages of practical, condensed information, tables, rules and diagrams. Price $1.00—Remit with order to
KEENEY PUBLISHING COMPANY
6 N. Michigan Ave., Chicago, Ill.

LLOYD'S STAINLESS STEEL SOLDERING FLUX
NO NOXIOUS FUMES NO SPLATTER
NO CRAWLING NO CREEPING
Endorsed by the nations leading producers of stainless steel and used by the largest fabricators of stainless steel products.
If LLOYD's FLUX is not entirely satisfactory, we will cancel our invoice.
Pint $1.50 Quart $2.50
Note: Cannot be mailed.
LLOYD S. JOHNSON CO.
2241 Indiana Ave., Chicago

QUALITY REPAIR PARTS
for all makes of
FURNACES AND BOILERS
PROMPT SERVICE
• Free Catalog to Trade •
SHAMBLEN
FURNACE PARTS CO.
Pittsburgh, Pa.

DO BETTER MORE PROFITABLE WORK WITH
ACCURATE VENTILATORS
There's plenty of profits and better work on installations when you use Accurate Ventilators exclusively. Try them on your next ventilation job: their performance will surprise you.
Made in various sizes and reasonably priced, these Ventilators help you to meet and beat competition in both price and quality.

WRITE US TODAY FOR LITERATURE, PRICES AND IMPORTANT VENTILATION DATA.
ACCURATE MFG. WORKS
2336-38 Milwaukee Ave. Chicago, Ill.

JUST OFF THE PRESS—SEND FOR YOUR FREE COPY TODAY
Catalog 393 contains complete descriptions and listings of America's Largest Stock of New, Rebuilt, and Used Punch Presses, Sheet Metal Machinery and Machine Tools.
Describes OVER 2,000 TOOLS in stock for immediate shipment. Completely indexed. Full specifications. Over 200 illustrations, 52 pages. Durably bound for permanent reference.
INTERSTATE MACHINERY CO., Inc.
107 S. Clinton St. Chicago

Classified

SITUATIONS WANTED

First class tinner, all lines heating ventilating, air conditioning industrial work, etc. Will go anywhere. Last place twelve years. Address Key No. 471, American Artisan, 6 N. Michigan Ave, Chicago, Ill.

FOR SALE

FOR SALE: Part of milk can retinning equipment, "thermostat, oil burner, tin pot." Instructions for retinning free. You can make balance of equipment and save money. Very profitable business retinning milk and cream cans. Address Retinning Manufacturing Co., 3021-3 Greenview Ave., Chicago, Ill.

Brake shear, Double Duty make, mounts on 8' 18-gauge Chicago brake. Plain roller 31". Squaring shear, 8', foot power. Very reasonable. Address Lester Muenchow, 2856 No. 23rd St., Milwaukee, Wis.

SITUATIONS OPEN

WANTED: Department Manager capable of estimating, selling and supervising the construction of all types of Sheet Metal and Roofing work. Such a man will be given an adequate drawing account against a percentage of the departmental profit. Good references as to ability and integrity are important. Address Key No. 470, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

WANTED: Salesmen to sell high grade gas and oil, furnaces to dealers at jobber prices. Straight commission basis. Give full particulars of your experience, capabilities and territory wanted in your first letter. Address Key No. 472, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

The American Artisan Service Section presents a golden opportunity to contact a national circulation at comparatively small cost. Manufacturers can use it to make any article sell and dealers will find it an inexpensive way to contact a live buying trade. Don't delay—send in your copy now for the next issue. See bottom of page for rates.

Index to Advertisers

Firms represented in this issue are identified by the folio of the page on which their advertising appears. Advertising which appears in other issues is marked with an asterisk.

☆ ☆ ☆

Accurate Mfg. Works....117
Acme Electric Welder Co....112
Advance Appliance Co.... *
Aerofin Corp. .... *
Air Control Products, Inc.... 22
Air Controls, Inc.... 89
Air-Maze Corp. 87
Aldrich Co. .... *
Allen Corp. 106
American Air Filter Co., Inc.... 44
American Brass Co.... 14
American Furnace Co.... *
American Radiator & Standard Sanitary Corp. 25
American Rolling Mill Co., The.... 29
Anthracite Industries, Inc.... *
Armstrong Co., The....103
Auer Register Co.... 16
Automatic Humidifier Co.... 83

Barber Gas Burner Co., The.... 32
Bead Chain Mfg. Co....105
Bellevue-Stratford Hotel 116
Berger Bros. Co....103
Bethlehem Steel Co.... 26
Beverly Shear Co....117
Bishop & Babcock Mfg. Co....109
Blake & Johnson Co....111
Blocksom & Co....113
Brauer Supply Co., A. G....112
Bremil Mfg. Co....112
Breuer Electric Mfg. Co....114
Buffalo Forge Co.... 95
Burt Mfg. Co.... *

Campbell, Andrew C., Div. of American Chain & Cable Co.... 89
Capitol Furnace & Stove Repair Co. 13
Carnegie-Illinois Steel Corp.... 6
Central Furnace & Stove Repair Co. 13
Century Electric Co.... 20
Chace Co., W. M.... 81
Char-Gale Mfg. Co.... 85
Chicago Filter Co.... 80
Cincinnati Sheet Metal and Roofing Co. 105
Circulators & Devices Mfg. Corp.... *
Clarage Fan Co....104
Conco-Samsel Stoker Corp.... *
Cook Electric Co....105
Cotta Transmission Corp....104
Crescent Tool Co.... 62

Detroit Lubricator Co.... 83
DeWitt Hotels 116
Doyle Vacuum Cleaner Co....112
Dreis & Krump Mfg. Co....114

Eisler Engineering Co....117
Electric Vacuum Cleaner Co., Inc....105
Elgo Shutter & Mfg. Co....114

Fireline Stove and Furnace Lining Co. 107
Fitzgibbons Boiler Co., Inc.... 15
Friez & Sons, Julien P.... *
Furblo Co. .... *

G & O Mfg. Co....107
General Electric Co.... 19
Gerett Corp., M. A....107
Gleason-Avery, Inc. 84
Goese Mfg. Co.... *
Granite City Steel Co.... *

Harrington & King Perforating Co...109
Hart & Cooley Mfg. Co.... 9
Henry Furnace & Foundry Co., The.. 98
Hess Warming & Ventilating Co.... 82
Hoffman Thermal Sales Co.... 90
Hotel Miami 116
Hussey & Co., C. G.... 31

Illinois Testing Lab., Inc....114
Independent Register Co., The.... 18
International Heater Co.... 95
International Nickel Co., Inc.... 5
Interstate Machinery Co....117

Joal Mfg. Corp....103
Johnson Co., Lloyd....117
Johnson Gas Appliance Co....115

Kerentoff, G. L....109

Laclede-Christy Clay Products Co....109
Lamneck Products, Inc.... ....Inside Front Cover
Lau Blower Co.... 96
Libbey-Owens-Ford Glass Co.... 12
Lincoln Electric Co.... *
Lochinvar Corp. 3
Lockformer Co. 108
Lohman, Inc., Wm. J....106

Maid-O'-Mist, Inc. 101
Marion Furnace Co....103
Maurey Mfg. Co....110
Mercoid Corp., The..Inside Back Cover
Meyer & Bro. Co., F.... *
Meyer Furnace Co.... 21
Michigan Tank & Furnace Co.... 86
Milcor Steel Co.....Outside Back Cover
Minneapolis-Honeywell Regulator Co. 91
Monmouth Products Co.... 97
Morency-Van Buren Div., Scovill Mfg. Co. .... *
Mt. Vernon Furnace & Mfg. Co.....108
Mueller Furnace Co., L. J.....27 and 93

National Super Service Co.... *
New York Trade School....117
Niagara Machine & Tool Works.... 99
Northwestern Stove Repair Co.... 13

Ohio Products Co.... *
Osborn Co., J. M. & L. A.... 11
Owens-Corning Fiberglas Co.... 76

Pacific Gas Radiator Co....100
Parker-Kalon Corp. 28
Peerless Electric Co.... 17
Peerless Foundry Co....115
Peninsular Stove Co.... 13
Perfection Stove Co.... *
Premier Division, Electric Vacuum Cleaner Co., Inc....105
Premier Furnace Co.... *
Pyrolite Products Co....115

Randall Graphite Products Corp.... 91
Register & Grille Mfg. Co.... *
Reliance Automatice Lighting Co.... *
Republic Steel Corp.... 34
Research Products Corp.... 85
Riester & Thesmacher Co....117
Rock Island Register Co....110
Round Oak Co.... 88
Ruberoid Co., The....101
Ruby Chemical Co....115
Russell Electric Co....111
Rybolt Heater Co.... 30
Ryerson & Son, Inc., Joseph T.... 8

SKF Industries, Inc.... 7
St. Louis Furnace Mfg. Co.... *
Schaefer Brush Mfg. Co....115
Scott-Newcomb, Inc. .... *
Scovill Mfg. Co.... 93
Scully Steel Products Co.... 33
Shamblen Furnace Parts Co....117
Skilsaw, Inc. .... *
Skuttle Humidifier Co., J. L....102
Standard Stamping & Perforating Co. *
Stanley Elec. Tool Div., The Stanley Works 99
Superior Sheet Steel Co.... *

Torrington Mfg. Co.... 87
Tubular Rivet & Stud Co....107
Tuttle & Bailey, Inc.... *

U. S. Air Conditioning Corp.... 81
U. S. Register Co. 75
U. S. Steel Corp.... 6
Utility Fan Corp....115

Victor Electric Products, Inc....113
Viking Air Cond. Corp.... 10

Ward Machinery Co....115
Waterloo Register Co.... *
Weil Pump Co.... *
White Mfg. Co.... 94
White-Rodgers Elec. Co.... 24
Whitney Mfg. Co., W. A....111
Whitney Metal Tool Co....113
Williamson Heater Co....111
Wilson, Inc., Grant.... 92
Wiss & Sons Co., J....115
Wodack Elec. Tool Corp....117
Wood Industries, Inc., Gar....113

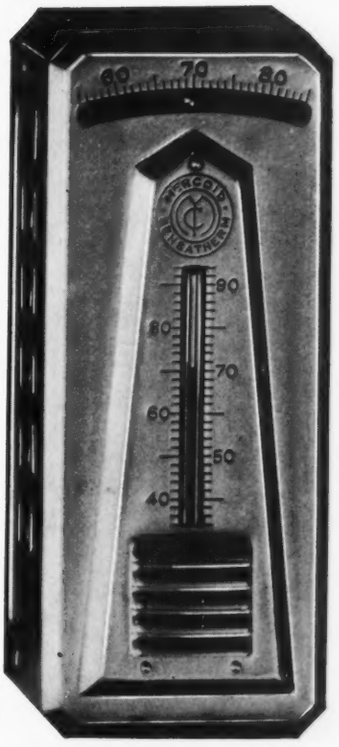
Youngstown Sheet & Tube Co.... 23

THIS IS

The Voice of Experience

SPEAKING

PLAN YOUR HEATING SEASON WITH MERCOID CONTROLS



MERCOID SENSATHERM the world's most dependable thermostat . . now available with the new Alumilite finish.

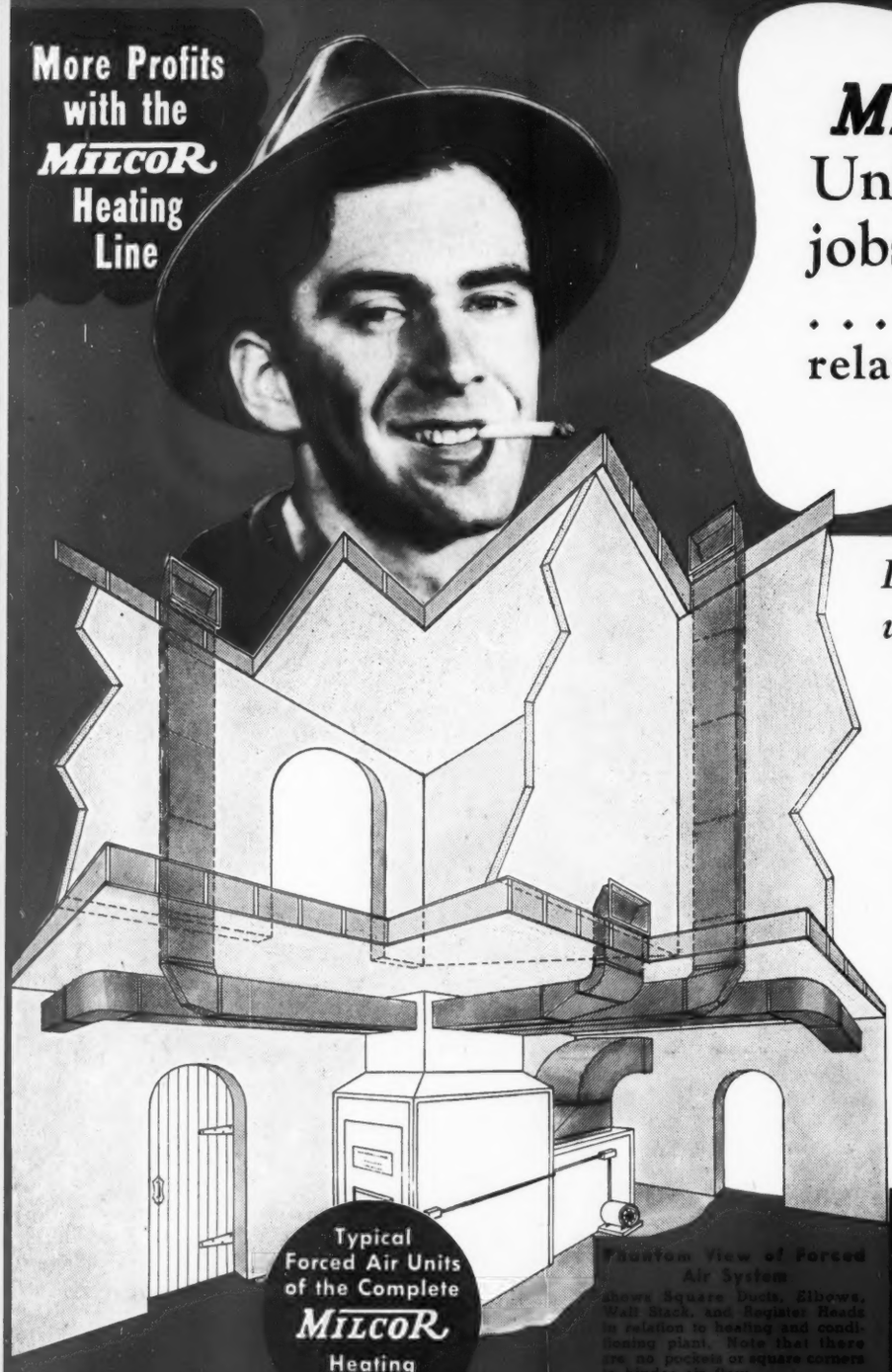
The composite voice of users of Mercoid Controls, coming from the length and breadth of the land, is the *"Voice of Experience"* declaring in no uncertain terms, that Mercoid Controls—Stay put after they are installed . . Are giving trouble-free service . . Are dependable under all operating conditions . . Are accurate in operation . . Are easy to install and adjust . . Last longer . . Give complete satisfaction . . Give you greater control value for your money. • The Mercoid hermetically sealed mercury contact switch, used exclusively in all Mercoid Controls, cannot be affected by dust, dirt, or corrosion. • Make this a Mercoid year and note the difference. • All orders will receive prompt attention. If you do not have a Mercoid catalog, write at once.

THE MERCOID CORPORATION • 4201 BELMONT AVE. • CHICAGO, ILL.

More Profits with the MILCOR Heating Line

MILCOR Forced Air Units help us get more jobs and bigger profits

. . . *because this* complete, related system *meets* almost every condition



Typical Forced Air Units of the Complete MILCOR Heating Line

Phantom View of Forced Air System
Shows Square Ducts, Elbows, Wall Stack, and Register Heads in relation to heating and conditioning plant. Note that there are no pockets or square corners to hinder air flow.

Forced air problems don't "stump" you when you rely on this complete line

The Milcor Forced Air Line puts you in a position to make more money, with a complete "family" of products that help you meet almost every condition in working with air conditioning plants, trunk line systems, and other types of heating installations using forced air.

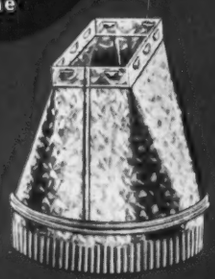
This related system of standard parts, engineered to work together, eliminates much confusion and waste of time, effort and materials . . . gives you assurance of good results every *time*—jobs that are completed smoothly, quickly, and *profitably*.

Milcor's strategically-located plants are equipped to give you speedy service. Every item in your order is *right*, so you can give customers a good-looking, safe, satisfactory job and make them willing to recommend you to others.

Join the many sheet metal men who are enjoying more work and bigger profits — use Milcor on all your forced air jobs. Write for free, colorful Milcor Forced Air Book today.

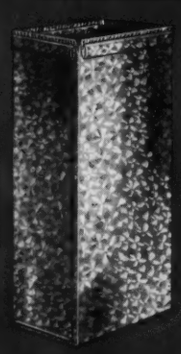
MILCOR STEEL COMPANY
MILWAUKEE, WISCONSIN — CANTON, OHIO
CHICAGO, ILL., KANSAS CITY, MO., LA CROSSE, WIS., ATLANTA, GA.
NEW YORK, N. Y., ROCHESTER, N. Y., BALTIMORE, MD.
Sales Offices: Minneapolis, Minn., Little Rock, Ark., Dallas, Tex., Denver, Colo., Washington, D. C., Boston, Mass.

No. 515 Elbow



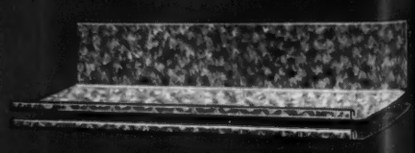
No. 716 Boot

No. 710 Wall Stack Angle



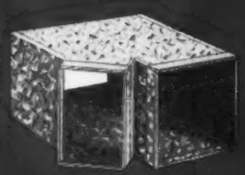
No. 500 Duct

Forced Air Duct
Shipped nested. Assembled on job by inserting seams on opposite edges. Made in all desired sizes. Designed for easy, rapid installation.

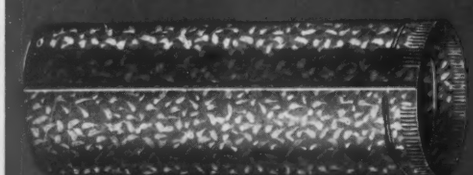


No. 500 Duct S.D.

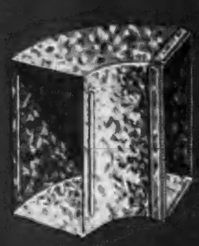
No. 580 Increaser Splitter



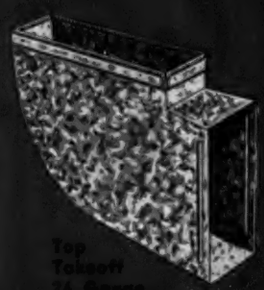
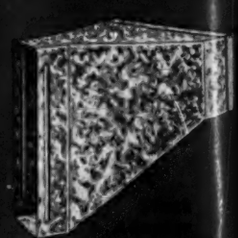
No. 586 Branch Outlet



Galvanized Round Forced Air Pipe
makes possible greater efficiency at lower material and installation cost, in many forced air systems.



Side Takeoff 26 Gauge 90°



Top Takeoff 26 Gauge